REPORT RESUMES

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A STUDY OF THE CONCENTRATION OF EDUCATIONAL MEDIA RESOURCES TO ASSIST IN CERTAIN EDUCATION PROGRAMS OF NATIONAL CONCERN. PART II--EDUCATIONAL MEDIA AND VOCATIONAL EDUCATION. FINAL REPORT.

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EDUCATIONAL MEDIA COUNCIL INC., WASHINGTON, D.C.

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THIS STUDY EXPLORED THE ROLE OF EDUCATIONAL MEDIA IN VOCATIONAL EDUCATION, TO ASSIST THE U.S. OFFICE OF EDUCATION IN FORMING EDUCATIONAL POLICY. 4 APPENDED POSITION PAPERS AND THE SECTIONS ON RESULTS AND RECOMMENDATIONS ARE THE MAIN ELEMENTS OF THE REPORT. THE STUDY RESULTS ARE A SERIES OF OBSERVATIONS ON VOCATIONAL EDUCATION'S INADEQUACIES IN (1) THE GENERAL USE OF MEDIA, (2) INSTRUCTIONAL MEDIA MATERIALS, (3) FACILITIES AND EQUIPMENT, AND (4) PERSONNEL TRAINING AND INFORMATION DISSEMINATION. A RECOMMENDATION THAT THE USOE RECOGNIZE THE GREAT CONTRIBUTIONS EDUCATIONAL MEDIA AND MEDIA SYSTEMS CAN MAKE TO VOCATIONAL EDUCATION IS SUPPORTED BY SPECIFICS URGING A NATIONAL PROGRAM TO PREPARE OCCUPATIONAL INFORMATION IN NEW MEDIA FORMS, NATIONAL CURRICULUM AND COURSE DEVELOPMENT PROJECTS, A MEDIA EVALUATION PROJECT, A PROJECT TO IDENTIFY AND MAKE AVAILABLE MEDIA MATERIALS DEVELOPED IN BUSINESS-INDUSTRY AND MILITARY GOVERNMENT, A SYSTEM PROVIDING INFORMATION ON NEEDED CHANGES IN MEDIA, USOE LEADERSHIP IN FORMING STANDARDS FOR INSTRUCTIONAL HARDWARE, A USOE PROGRAM OF MEDIA INFORMATION DISSEMINATION, MEDIA INSTITUTES FOR TEACHERS OF VOCATIONAL-TECHNICAL COURSE, AND THE ESTABLISHMENT OF AN AGENCY WITHIN THE USOE RESPONSIBLE FOR EDUCATIONAL MEDIA. (MS)

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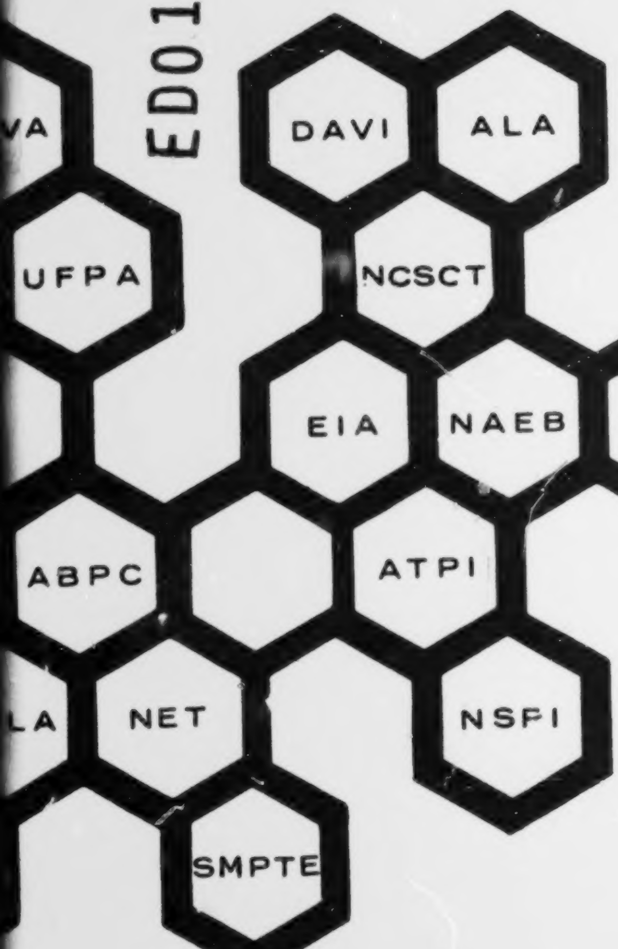
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The EMC Educational Media Council

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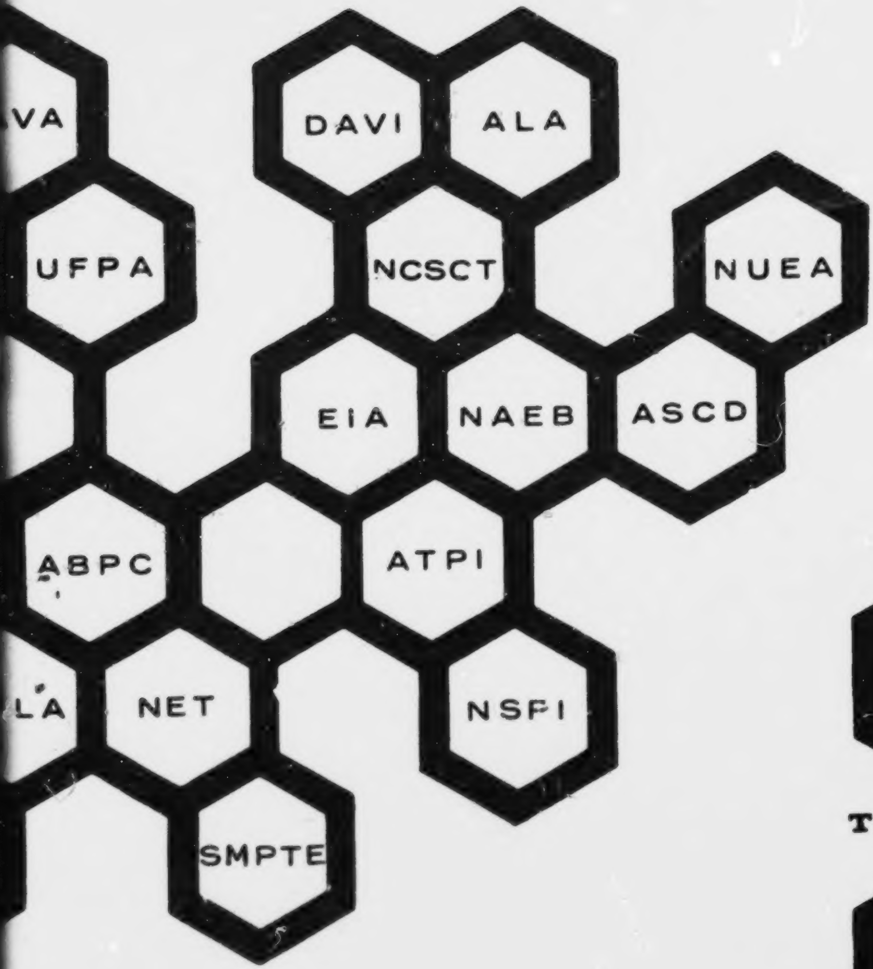
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A STUDY OF THE CONCENTRATION OF EDUCATIONAL MEDIA RESOURCES TO ASSIST IN CERTAIN EDUCATIONAL PROGRAMS OF NATIONAL CONCERN

PART II: EDUCATIONAL MEDIA AND VOCATIONAL EDUCATION

Project No. 5-0080
Contract No. OE 5-16-032

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for

the EMC Committee on Vocational Education

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The research reported herein was performed pursuant to a contract with the Office of Education, U.S. Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

Educational Media Council, Inc.

Washington, D.C.

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CONTENTS

Introduction 1

Method 7

Results 11

Recommendations 19

References 24

Appendices

Appendix A: "Developing the Vocational Course" by Robert F. Mager and Kenneth M. Beach, Jr.

Appendix B. "The Feasibility of Using Newer Educational Media Produced by and for Business-Industry and Military-Governmental Agencies in Vocational Education Programs", by Raymond Wyman.

Appendix C: "Guidance, Educational Media, and Vocational Education", by Kenneth B. Hoyt and William D. Griffith.

Appendix D: "Strategies for Optimizing the Application of Media to Vocational and Technical Education Curricula", by Robert E. Taylor and Virgil E. Christensen.

Appendix E: "A Selective Bibliography on New Media and Vocational Education and Retraining", by Clarice Kelley.

Appendix F: "Availability of Media Courses in Teacher Education for Vocational Education".

PART II: EDUCATIONAL MEDIA AND VOCATIONAL EDUCATION

Introduction

The report transmitted in this document should not be viewed as a research report in the classical sense. It is, rather, a study in educational policy conducted by the Educational Media Council for the U.S. Office of Education. Through the instrument of its attachments, a good deal of substantive information is presented, but the purpose of the study was not to furnish substantive information, which the U.S. Office of Education has in abundance -- rather, its purpose was to arrive at educational policy.

The purpose of this policy study by the Council, therefore, was to examine the field of vocational education, particularly that segment embracing public education from grades seven through fourteen, and to suggest policies and/or strategies by which educational media might be better designed, developed, and used to improve teaching, learning, and communication functions in vocational education.

Vocational education in the United States has been the subject of much attention in recent years, particularly since the passage of the Vocational Education Act of 1963. It has been one of the major concerns of those who work with disadvantaged youth and who worry about such things as unemployability, deliquency, and riot prevention. Other concerns are expressed in the writings of economists, industrialists, and Government officials who deal with problems of employment; with the stepped-up invasion of automation; with the long span of retirement years; with the economic values of an education; with manpower problems which include national needs, unemployment -- temporary and structural, and shifts in jobs and job locations. Finally, of course, there is the general national concern for a better and more productive life -- a certain segment of which must be related to earning a living.

The special Vocational Education Committee of the Educational Media Council has examined a great deal of the literature on vocational education and find it vast, wordy, critical for the most part, and indecisive. For at least a decade, vocational education has been under intense fire from all sides -- from Robert Hutchins' Center for the Study of Democratic Institutions to the U.S. Naval Personnel Research Activity in San Diego. Only recently have suggestions been made which show some promise toward restructuring and guiding vocational education into the last half of the Twentieth Century.

It would appear that the small community of people who cared about properly educating those heading for non-academic activities have not been able to be heard, or have not found a way to insure consideration of their case. Much of the criticism of the existing status of vocational education, both before and after the passage of the 1963 Vocational Education Act, are addressed to the inadequacy of the 50 State systems which are supposed to do the job. The 1963 Act enabled some progressive activities, but among its weaknesses is the inadequacy of appropriations available to the States for implementation of their plans and programs. Also conspicuously lacking is provision for such resources as curriculum plans and materials, appropriate methodologies, adequate counseling and guidance, necessary facilities, and increased staffing. Lacking, too, in the work in progress under the 1963 Act is the kind of comprehensive, overview planning which -- most probably through a systems analysis approach that has apparently not even been considered -- could induce coherence and enhance efficiency in a national effort that is fragmented by definition and by law.

We found five reports to be of particular significance in our study. Two were reports of the National Commission on Technology, Automation, and Economic Progress (Volume I (1966) and Volume IV (1966)); the volume of the Senate hearings before the Clark Sub-Committee (1965) edited by Garth Mangum; the report by Grant Venn for the American Council on Education (1964); and the Dale Draper report for the National Committee on Secondary Education of the National Association of Secondary School Principals (1967). While there was some disagreement among these reports, in general they tended to look at the future within the same context, and provided sufficient guidelines to the EMC committee so that, given the type of structure suggested in the reports, the media dimensions of the program could be examined.

Such guidelines were an absolute requirement, because vocational education, even more than other forms of education always presents a logical trap when it is discussed. Theoretically, vocational education must always be related to the present and future state of the art of industrial technology; to the health of the economy and the concommitant employment or unemployment, to the state of occupational information and guidance; to the political-social-economic relations inherent in apprenticeship and other on-the-job training systems; to vested interests of various types; to the balance present at any given time in the educational system between State departments, school districts, and the like; and to the state of educational theory as it wrestles with such questions as vocational versus general education.

If none of these relationships is given, any consideration of media within the vocational education structure must first take a position on, and theoretically solve, all of these problems. The committee responsible for this report found itself in the middle of this logical trap for a while, and attempted to deal with broad questions such as a national systems analysis of the economic and manpower requirements as a prerequisite for the determination of curricula, as a prerequisite for the analysis of curricular objectives, as a prerequisite for the determination of media applications. Obviously, such an approach was beyond the capability of both the committee and the Council.

Therefore, in getting out of this snare, we had to come to grips with the same problem that Dr. O.L. Davis refers to in Part I of this report, on the education of the culturally disadvantaged. As he says, "caution, deliberation, and carefully detailed planning prior to action are not viable alternatives to immediate, decisive moves."

If anything might be done with our study, it could not be allowed to hang up on such debatable issues as whether or not vocational education should be conducted in a comprehensive high school, a vocational-technical high school, or an area vocational center of post-high school level, or combinations of all three. Hence, the literature was searched for acceptable guidelines. As was mentioned above, the reports which were the most up-to-date and the most useful contained substantial, if not complete, agreement on most of these matters. Of these reports, the recommendations of the National Commission on Technology, Automation, and Economic Progress seemed the most succinct and the most representative of a broad sector of the national community. If a research purist would demand that we state our fundamental assumptions, perhaps he would find them here. We prefer to think of them as guidelines for our studies. In order to make these guidelines a matter of record, we quote from the report.

> Preparation for Work
>
> 10. For most secondary school pupils, vocational training in the sense of developing entrance skills for a job should be deferred to the posthigh school years. Vocational education should become increasingly general, exploratory, and guidance-oriented in the high school. Some preparation for semiskilled, clerical, and service occupations, with accompanying on-the-job training, may

be desirable for pupils with limited academic ability in order to motivate them to remain in school; but at most, this would involve a small percentage of any student body.

11. Opportunities for education for the world of work are many and varied, and diverse institutions and agencies are needed to meet the differing requirements of the many vocations and professions. Apprenticeship, cooperative work-study programs, area vocational schools, private vocational schools, community colleges, colleges and universities all have roles. Business and industry also bear responsibility for vocational preparation, particularly for upgrading and updating employees. Increasingly, programs sponsored by corporations are being meshed with those of educational institutions.

12. The public area vocational school should provide vocational training in trade, technical, and business occupations at the skilled-worker level. The primary emphasis of the area vocational school should be on initial youth training for employment, with a secondary emphasis on adult retraining. The area vocational school should anticipate that most of its students will be high school graduates. Provision must also be made for some high school dropouts, college transfers, and unemployed workers.

13. The Community college should provide high-level technician and semiprofessional training as the primary emphasis of the vocational education part of its program. Both community colleges and area vocational schools should be regarded as part of the State's educational system as well as being regionally oriented. Except for programs demanding large numbers of workers, vocational training opportunities in the different institutions should complement rather than duplicate each other. Mobility between institutions should be encouraged, and a student should be able to enter the program of his choice, regardless of the location in the State where the program is offered. Thus dormitories will be needed at many area vocational schools and community colleges.

14. With respect to colleges and universities, there is a great need and sound justification for supporting still greater expansion of graduate programs as preparation for employment, with relatively more general education emphasized in the undergraduate years.

15. Much more needs to be done to help college dropouts plan

for alternative ways of securing education for employment.

16. Adult vocational education must be considered an important aspect, not an incidental service, of education at many levels. For unknown thousands, new techniques are making old skills obsolescent and new skills mandatory. Many workers show great resourcefulness in improving their own performance, or in moving to new jobs. But great numbers of the displaced are forced to turn to work far below the level of their competence, or are cast aside from the main stream of productive effort.

17. Adult vocational education in elementary and secondary school settings should concentrate largely on providing basic education in fundamental academic skills and providing training in semiskilled and service occupations. Adult vocational education in the private school and the area vocational school should provide both upgrading and updating instruction at the skilled-worker level, and remedial basic academic instruction should not be a major instructional objective in such settings. The community college plays an unique part in the technical and semiprofessional areas of vocational education. The colleges and universities have a vital updating role in adult vocational education, particularly in the professions. This function deserves wider recognition.

18. Many apprenticeship programs are rigid and inflexible. In preparing for some occupations, greater willingness should be shown to experiment with alternative approaches to learning required skills. More attention should be paid to the selection of apprentices on objective bases related to probable success in the vocation. There should be more meaningful integration with formal education offerings.

19. Vocational training programs developed under the Manpower Development and Training Act should serve a different clientele and not compete for students with similar programs in public area vocational schools. The assumption should be tested that unemployed workers drawn to MDTA training programs through financial subsidies will, in fact, become motivated to enter occupations for which training is provided.

(National Commission Volume IV,
1966, pp. IV-68IV-69)

Secondly, we found Dr Grant Venn's premises and conclusions concerning vocational education to be very helpful in guiding our thinking. There are several slightly different versions of these in existence, but we found his paper for the Clark Subcommittee to contain the most inclusive statement Again, we present it for the record:

First	Every person must learn to read, write and compute.
Second	A new attitude toward work and a new relationship between education and the work world must be developed.
Third.	Special programs must be developed for youth with special needs
Fourth.	A vast expansion of postsecondary education opportunities is necessary.
Fifth	Continuing education must become a major purpose and function of education
Sixth	Local school systems and educational institutions must develop programs and services based on the national nature of change.
Seventh	Today the major responsibility for individual selection of proper educational programs and occupational preparation rests with education.
Eighth	Education must accept the responsibility of every job placement or educational reassignment for every student
Ninth	Continued study of long-range manpower needs in terms of educational programs facilities, organization and time factor is necessary to reduce educational lag
Tenth	Postsecondary vocational and technical education must be available at a cost to the individual which will allow people to enroll on the basis of interest and ability, rather than financial capability
Eleventh	The development of an adequate occupational education program within the educational system is a prerequisite to a successful program of training retraining, and

the development of occupational flexibility.

(Mangum, 1965, pp. 411-415)

To conclude this introductory statement, the EMC committee's task was to examine the general problem of vocational education in the United States in order to suggest educational policies and strategies which would result in the better design, development, and application of educational media to the problems of vocational education. As guidelines for this somewhat specific task, we used several current and widely accepted reports as maps to the state of the art and the future direction of vocational education.

Method

The Part I companion paper to this report refers to the basic contract and the actions of the Educational Media Council which followed it. That history will not be repeated here. At the seventeenth meeting of the Council (May 19-21, 1965), a task force was appointed to begin initial thinking about the study of vocational education and educational media. The original task force consisted of the following:

Ben Edelman, Chairman
Mr. Edelman represents the Electronic Industries Association on the Council and is Manager, Defense Activities Division of the Western Electric Company, Inc.

Stanley P. Lapin
Mr. Lapin also represented the Electronics Industry Association, and at that time was an official in the new Educational Systems Division of Litton Industries

Robert E. Slaughter
Mr. Slaughter represented the American Textbook Publishers Institute on the Council, and is Executive Vice President of McGraw-Hill, Inc.

In January, 1966, a formal committee was appointed as follows.

James D. Finn, Chairman

Dr. Finn represents the Department of Audiovisual Instruction of the National Education Association, and is Professor of Education at the University of Southern California.

Lee Cochran

Mr. Cochran represents the National University Extension Association on the Council, and is professor and head of the Audiovisual Center of the University of Iowa.

Ben Edelman

Robert Mager

Dr. Mager represented the National Society for Programmed Instruction on the Council, and at that time was Director of the Behavioral Research Laboratories of Xerox, Inc.

Trevor Serviss

Dr. Serviss represents the American Textbook Publishers Institute on the Council, and is Vice President of the L.W Singer Publishing Company.

The subsequent efforts of this committee were assisted and supported at EMC meetings and on other occasions by representatives of the fifteen member organizations of the Council ,which are:

American Book Publishers Council
American Library Association
American Textbook Publishers Institute
Association for Supervision and Curriculum Development
Department of Audiovisual Instruction, NEA
Educational Film Library Association
Electronic Industries Association
National Association of Educational Broadcasters
National Audio-Visual Association
National Center for School and College Television
National Educational Television
National Society for Programmed Television
National University Extension Association
Society of Motion Picture and Television Engineers
University Film Producers Association

The original task force met in New York in July of 1965 to begin designing the study. Dr. E.H. Miner, President of the Voorhees Technical Institute of New York City, was asked to serve as a consultant. The committee also met with Dr. Herbert Striner of the W E. Upjohn Institute for Employment Research. An initial design was developed and reported to the Council.

At the same time, the staff of the Council was asked to begin collecting materials, and also to begin a dialogue with officials of the U.S. Office of Education concerned with vocational education. On the recommendation of Dr. Otto Legg, of the U.S. Office, and others, several of the Regional Conferences on vocational education sponsored by the U.S. Office of Education were attended by staff members. The most valuable results of this effort was to develop contacts in the vocational education field, and a thorough familiarity with U S O E. policy as it related to State programs.

Discussions were continued by the task force at the October EMC meeting; and a formal report was made to the Council, after which reactions were solicited. The staff continued its work of developing background; identifying people, places, and events; and probing for spots where media applications to vocational education might make a difference. Several in-house papers were produced, including one by the Executive Director of the Council exploring the relationships between the study of the culturally disadvantaged and the vocational education study.

The January meeting of the Council, wherein the Vocational Education Committee was formally appointed, resulted in a sharpening-up of the tasks of the project. It was decided to commission a number of studies as follows:

1. The preparation of a bibliography. A Selected Bibliography on New Media and Vocational Education and Retraining. This appears as Appendix E of this report, and was prepared by Clarice Y. Kelley, a staff member.

2. A study relating to guidance and media in the context of vocational education. This study appears as Appendix C, as follows:

   Hoyt, Kenneth B., and William D. Griffith. Guidance, Educational Media and Vocational Education.

3. A study of educational media in the context of the changing vocational education curriculum. This study appears as Appendix D, as follows:

   Taylor, Robert E., and Virgil E. Christensen. Strategies for Optimizing the Application of Media to Vocational and Technical Education Curricula.

4. A study of the development of a model vocational course in order to show ideal possibilities of media applications to classroom instruction in the vocational setting. This study appears as Appendix A, as follows

   Mager, Robert F., and Kenneth M. Beach, Jr., Developing the Vocational Course.

5. A study of possible outside sources of media -- principally from industry and the military, and also with some suggestions for bringing this material under bibliographic control. This study appears as Appendix B as follows:

   Wyman, Raymond. The Feasibility of Using Newer Educational Media Produced by and for Business-Industry and Military-Governmental Agencies in Vocational Education Programs.

In the interest of accuracy, it should be stated that not all of these studies were commissioned at the one meeting, nor in exactly the order cited; but evolved into the final design as listed here.

The staff was asked to continue to gather and search literature, and to contact as many sources of information and ideas concerning vocational education as possible. Many people in government, industry, and associations such as the American Vocational Association were contacted.

In addition, the staff was asked to conduct a number of probes, and to find answers to some questions, e.g., what is the extent of instruction in the new media in programs of teacher education for persons preparing to be vocational teachers? These activities resulted in several in-house reports.

A teacher education survey -- an analysis of the requirements and offerings in the field of educational media for vocational teachers -- was conducted and made available to the committee and the Council. This in-house study appears as Appendix F

Visits were also made to a number of key installations where media were supposed to be used well in vocational programs. These installations ranged from county school systems, through community colleges, to Job Corps camps. A telephone survey was also conducted of ten State departments of education recommended by the U.S O E as doing the most with media in programs of vocational education.

Finally, a series of deliberations by the committee and by the committee with the rest of the Council were conducted. The committee, for example, met once with the staff of the Center for Research and Leadership Development in Vocational and Technical Education at Ohio State University, and was greatly helped by the counsel received. It is from these deliberations, backed up by the studies and information development described above, that the policy recommendations were derived.

Results

The major substantive results of the Council's study of the problem of educational media in vocational education are contained in Appendices A through F. The content of the Appendices will not be repeated here, as it is too divergent, too complex, and too important. The reader is asked to refer directly to the Appendices.

We can, however, state some generalizations which could be considered "results" if anything beside recommendations can truly be said to be derived from policy studies. It should again be emphasized that these results exist as across-the-board facts, events or processes and will apply equally well to all possible schemes for organizing and conducting vocational education. The list follows:

1. Observations as to the General Use of Media in Vocational Education

a. While there has always been a tradition in vocational education which has looked with favor upon wide use of the conventional audiovisual media -- films, filmstrips, mock-ups, models, charts, and the like -- and some attention is now being given to the newer educational media such as television, the fact remains that media use in all phases of vocational education is sadly limited compared to need and possibility; and, is too many cases, the uses that are made of educational media show up to be unimaginative and even dull and boring.

Robert Mager has noted that educational media, like other instructional procedures, are not used more frequently because even those potential users who know how to use them do not know when to use them. They do not instinctively reach for the appropriate procedure when the learning task calls for it. One of the purposes of the EMC Vocational Education Committee in commissioning the papers which are the substantive complements of this report was to suggest ways of assisting practitioners to understand the essentials of instructional technology. Dr. Mager, in his own paper (Appendix A, p. 22), begins with the first step: "In the way one selects a tool from the toolbox by knowing what he needs to accomplish, one chooses an instructional procedure by first identifying what kind of performance he wants to develop, by knowing what he wants to accomplish ... There are several different kinds of performance, and different procedures and materials are appropriate for teaching each. For example, a simulator might be highly appropriate in teaching someone to fly a plane, but it would be inappropriate in teaching him how to spell." Mager further devotes an entire chapter (Appendix A, pp. 45-50) to specific counseling on the selection of instructional procedures and materials in vocational education.

In another of the accompanying papers (Appendix B, p. 5), Raymond Wyman points up the special efficacy of instructional technology in vocational training: "The needs of vocational education for newer media are great, probably much greater than for students in regular schools. Vocational students tend to be less print oriented. They choose material with more graphic and pictorial illustrations. Their interest in newer media tends to be high. They spend much time with television and movies. There is less need for simple and easily described skills, and a rapidly increasing need for complex and difficult skills. Newer media have proved very effective with these students in these subject areas."

Robert Taylor and Virgil Christensen amplify another special dimension of media application in vocational education (Appendix D, p.5): " . . . it may be that because of the emphasis on the psycho-motor domain in certain aspects of Vocational and Technical Education, media may have even more intensive and extensive use. This is not to say, however, that applications of media are not as desirable in the cognitive and affective domains of Vocational and Technical Education, but recognizes the relative emphasis of Vocational and Technical Education on 'learning by doing'."

b. Given the fact that the several State departments of education have, under the vocational education laws, a great deal of authority and responsibility for vocational education, it is within these sub-agencies that one might expect to find leadership in applying media to educational problems. Investigation reveals that this is, in fact, not true; we found that the vocational agencies in State departments of education have generated no real media programs and are not exerting leadership, for example, comparable to that exercised by their own State department colleagues in such fields as special education where imaginative media programs have been put in operation. In fact, we have the definite impression that the people responsible for vocational-technical education operate in isolation from other media developments.

c. Even though there is much talk of computer-assisted instruction and other exotic media approaches to teaching, learning, and communication within the Bureau of Research of the Office of Education and in other divisions of the Office, for that matter -- we find that the hard-core media problems have not been approached either systematically or vigorously. There is, really, no systematic attack existing, or, as far as we can tell, intended, on the problems of improving vocational curricula through media, on media development in vocational education, etc. This lack of attention to media problems, however, is not confined to the vocational-technical area within the U.S. Office.

The media community has long noticed a singular reluctance on the part of policy-controlling officials, from the Commissioner down, to engage with the area of educational media-technology. While it may not be true, as some claim, that there is a deliberate Office policy to downgrade educational media/technology, we do sense a growing apathy. We also note that inaction, chaos, and lack of policy are the best ingredients in the world to kill off possibility and potential. The possibilities and potential of the great range of media -- film, television, programed instruction, and all the rest -- are crucial to the conduct of almost any type of vocational-technical education. As we said, we looked for a thrust -- a systematic attack -- and found it missing. And no amount of action in exotic electronics, information storage and retrieval systems, or packaged courses for the Naval Academy will fill this crucial vacuum.

d. In the whole field of vocational-technical education -- both in its organizational and operational aspects and in its professional aspects -- we sense a block which seems to have prevented the leadership from thinking through curricular and teaching-learning-communication problems. This block is related to the logical trap discussed in the introduction: apparently few of the basic arguments in the vocational-technical field have been settled and, hence, continue on into time. The crucial processes -- communication and learning -- seem to have to wait until the questions of levels, patterns of organization, and responsibility have been worked out. Our observation is that, even though the comprehensive vs. the technical school argument is in a state of flux -- for example, young adults are attending vocational classes, are being taught -- or, at least, taught at -- and this process can be improved now through the judicious application of educational media /technology.

2. Observations as to the State of Instructional Materials (Media)

a. One of the continuing criticisms of many current vocational-technical education programs of all types is the charge that the content is obsolete -- that, for example, students are still being instructed in a vacuum-tube technology in a time of micro-electronics. This condition, we believe, also holds true for the materials used in vocational education every day; we believe that many of the currently used films and filmstrips, for example, are obsolete.

In this report to the U. S. Office of Education, it is perhaps ironic to note the fact that most of the now-obsolete vocational films, filmstrips, and related materials currently in use are the products of a large program established by the U.S.O.E. to create visual materials for the training of the thousands of skilled workers needed for wartime production in World War II. In a 1946 (Number 3, Volume 7) issue of Business Screen Magazine carrying a feature article on the large-scale wartime U.S.O.E. film program, the magazine's editors commented, "It was Dr. John Studebaker, U.S. Commissioner of Education, who first recognized the great possibilities of this wartime visual training program ... The credit for the production of 457 film subjects, running nearly twice that number of actual reels, goes where credit is surely due: to all concerned. To the 36 producers who turned out the films, some of them in record time; to the entire wartime staff of the Division of Visual Aids for Training; and to the hundreds of advisors and consultants who helped make these films so widely useful -- we speak in tribute."

With the end of World War II, the U.S.O.E.'s industrial training audiovisual program also ended -- but, after more than 20 years, the materials it produced go on and on.

The Educational Media Council ventures to speculate about the effect on vocational training in 1967 if only a modest adumbration of the wartime U.S.O.E. vocational education materials program were available to the industrial-vocational teacher today. The very fact that so large a proportion of the materials in use in vocational education are obsolete provides an unique opportunity for a complete restructuring, with development of entirely new materials and full utilization of the most appropriate media systems.

b. Much of the currently used material is not closely related to existing curricula or objectives. Media have been treated as addenda, as interesting appendages, instead of as the bricks from which actual curricular experiences are built. Operationally, this means that the best possible utilization cannot be achieved; and, futher, that the possibilities of using media as an instrument of curricular reform are being missed.

c. Little of the available material has apparently been built on a theory of vocational generality. That is to say, as Dr. Mager has pointed out, general areas of common skills have not been identified among discrete vocational operations and educational media created around these common areas; the same thing,perhaps to a slightly lesser extent,also applies to media relating to "clusters" or "families" of vocations.

d. Dr. Davis noted in his report that the research effort seemed to be bypassing operational problems in the field of education for the disadvantaged; we, too, observed that the research effort in educational media for vocational education seems to be bypassing the operational in favor of the exotic.

Research information on the applicability of specific media to particular instruction tasks is not so far advanced as to be very serviceable, nor is the available information adequately structured and organized to be most useful to the curriculum builders. A sampling of fewer than a dozen ongoing research studies under the U.S. Office of Education's Division of Adult and Vocational Research which do include media applications is included in the bibliography attached to this report (Appendix E, pp. 23-26).

e. While it has long been known that a wealth of educational media/technology for vocational education exists in industry and the military and to a certain extent in business, there is no effort to locate, assess, index, and provide these materials for vocational education except, here and there, as a result of local initiative and with local results. Dr. Wyman discusses the feasibility of such use at some length in his accompanying paper (Appendix B).

f. We note the following high-priority needs for media in the vocational-technical field:

1. Orientation to work. With the general lack of work experience, young people need to be taught directly the nature of work, the expectations of a working world, etc. Much inventive new material is needed here.

2. Vestibule experiences. The old concept of the "vestibule" training program which prepares the trainee for the regular on-the-job training program is returning in a new form and demands new forms of media. Thus, disadvantaged teen-agers may need to be taught to read and calculate; and following that, may need instruction in the use of hand tools and in other simple operations before specific vocational-technical training can take place. Whole new systems of media are needed here.

3. Motivational materials. Much new material motivating students at all levels is required.

4. Human relations materials. Since much of the difficulties surrounding employment, job drop-out,

quality performance, etc. are related more to human relations than to skills, it is imperative that more and better human relations materials be produced.

3. Observations as to the State of Facilities and Equipment for Optimum Use of Educational Media/Technology

   a. We observed no great drive to design new facilities for vocational education that could make optimum use of educational media. Here and there, it is true, vocational facilities are being constructed with some reference to the use of educational media, notably in the program of the Educational Facilities Labortories dedicated to the designing of new facilities for vocational education; but, generally, such efforts are sparse, local, and few in number.

   b. The vocational educational community is apparently prepared to accept the chaotic standards situation existing in the field of instructional hardware. This is particularly regrettable, because the improvement of instructional hardware standards is a contribution vocational education could make to the whole field of professional education.

   One of the Guidelines prepared by the Educational Media Council for the U.S.O.E. in 1963, and revised and supplemented in 1965, was a report of a study of "Development of Recommended Technical Specifications on Educational Media". This Guideline urged the necessity of launching a national standards effort, and the Council is currently carrying on discussions with the United States of America Standards Institute exploring ways in which it may assist the USASI program.

4. Observations as to the State of Training of Educational Personnel and the Dissemination of Information

   a. The field of vocational-technical education has a peculiar task relating to the dissemination of occupational information to those who need it, whether they be young people trying to find a career, or older people attempting to select a new occupation before going in for retraining. Educational media -- or the techniques of educational media -- can make a great contribution to this dissemination problem. Except as we have noted elsewhere, there is little evidence that media are being used for this purpose. A significant exception, the experimental Specialty Oriented Student Research Program, is described in some detail in Appendix C of this report.

b. Apparently vocational education teachers who are being prepared in formal pre-service programs are getting neither more nor less training in the use of educational media than are other teachers. Due to the nature of instruction in the vocational-technical field, they probably need more -- and of the very best quality. There are no vigorous programs of media training for vocational-technical teachers of the type we feel should exist. Further, although we have little evidence on this point, we raise the question as to whether or not the journeyman-type vocational education instructor (in the States where these are certified) receives even a minimum of media training. A sampling of media programs -- or lack thereof -- is included in this report as Appendix F.

c. Again, it is very hard to find solid evidence to support this contention; but we feel that, at the most, the dissemination of information about educational media/technology throughout the vocational education community is no better than similar dissemination throughout education as a whole -- and it could be worse. Assuming it is about the same (and we do know that dissemination of media information throughout the educational community as a whole is low-level and ineffective), this represents a problem which should be attacked immediately.

Recommendations

We believe that vocational-technical education can be vastly improved in the United States by the adoption and implementation at Federal and

State levels of a policy that explicitly recognizes the great contribution the wide range of modern educational media and media systems (including the necessary hardware) can make to the improvement of the processes of teaching and learning, and to the curriculum in vocational-technical education. Our major recommendation, then, is that the United States Office of Education immediately adopt this proposition as basic policy in vocational-technical education, and mount a major leadership effort in applying educational media/technology to vocational-technical education. We further recommend that the several States adopt a similar policy immediately.

With this general recommendation as background, we submit the following additional specific recommendations.

We recommend that:

1. A program be mounted by a cooperative group consisting of representatives of school and training-program administrators, concerned business and industry groups, and the professional counseling and guidance societies to prepare, on a nation-wide basis, occupational information in new media forms of all kinds, such as the microcard materials used in the San Diego County Schools; the booklet materials developed at the University of Iowa; and other materials such as up-to-date films, television programs, and the like.

2. The U.S. Office of Education fund a national curriculum development project for several areas of vocational-technical education along the lines pioneered by the National Science Foundation in redesigning curricula in several of the basic sciences such as physics. One of the secrets of the successful NSF effort is that the curriculum development has been accomplished primarily by designing new educational media to do the job. We believe that this approach will speed up and improve curricular development in vocational-technical education; and that, at the same time, it will supply a portion of the much needed new educational media in this field. The areas to be so developed can be selected by national committees similar to those developed for the NSF projects. Taylor and Christensen include detailed and specific suggestions for media applications in their accompanying report (Appendix D, pp 7-11).

3. As a corollary to (2) above, the U.S Office of Education fund a project which can be called a "Model Course Development Project in Vocational-Technical Education". This project should be separate from the large curriculum development project, and follow the techniques suggested by Dr. Mager in his paper (Appendix A). Such a model could then be used at regional, State, and local levels.

4. The U.S. Office of Education, perhaps with some financial help from foundations and industry, fund a massive media evaluation project designed to review and evaluate all existing vocational-technical media now being used in public education to determine degree of obsolescence, quality, needed revision, and new production.

5. The U.S. Office of Education, again, perhaps in conjunction with other sources of financing, fund a massive national project designed to locate, evaluate, integrate with curricula, index, store, retrieve, and otherwise make available to schools, colleges, and other public vocational-technical education institutions that portion of the holdings of vocational educational media in the libraries of business-industry and military-government which would have value in the public vocational-technical education programs. (See Appendix B).

6. Perhaps as a piece of a larger systems design, but not necessarily waiting upon its development, the U.S. Office of Education fund an experimental project which will design, test and evaluate a feedback system providing information to producers and users of vocational-technical educational media about changes needed in media as a result of changes in industrial technology, the employment situation, or any other variable which might have an important effect. The objective here would be to design a system which would reduce obsolescence of existing materials to the lowest possible point and provide a means for introducing needed changes with some rapidity.

7. The U.S. Office of Education take an immediate leadership role in developing standards for instructional hardware.

There are several ways that this might be done. For example, grants to States for the purchase of instructional hardware might be made contingent upon agreement on standards; this, in turn, would of course require a national program of standards development. In view of its past studies of the need for standards, and because of the comprehensiveness of its constituency in the educational media field, the Educational Media Council should be called upon to assist this effort.

8. Those offices and officials in the U.S. Office of Education concerned with vocational-technical education mount their own program of dissemination of information to the vocational-technical educational community about the new educational media. This might well be done through the existing channels to the States or some other way. The point is that present U.S. Office of Education programs designed to do this -- particularly Title VIIB of the National Defense Education Act -- have been inefficient, and a new approach is needed.

9. As a corollary to (8) above, the vocational-technical education groups in the U.S. Office of Education fund a series of special media institutes for teachers of vocational and technical courses, using as a model the very successful institutes developed under Title XI of the National Defense Education Act under the direction of Dr. Donald Bigelow. In fact, a useful suggestion might be to transfer funds and authority to the Division of Educational Personnel Training to carry out this mission for the vocational-technical authorities in the U.S. Office. If such a program is not possible on a large scale due to the State-Federal relationship in vocational education, it is suggested that the States, then, be required to provide this service as one of the requisites for receiving funds to spend on media/technology.

10. The U.S. Office of Education subsidize the production and testing of prototype materials in the areas of priority designated in the preceding section.

11. The Bureau of Research recognize that much applied research is needed in the media field; and, also, that more research is needed on the uses, effects, message design factors, etc. of the more conventional media (films, filmstrips, television, etc.). While we recognize the need for, and applaud the imple-

mentation of, highly controlled basic research, we believe that there has been too much emphasis upon such rigorous designs with almost no effect on practices, except on the practice of other research workers of the same school. Further, as has been indicated several times in this paper, while we do not object to the investigation of exotic on-line computer-assisted instruction, for example, we are of the firm opinion that since the educational media field consists of much more than the latest information display devices, research funds should be directed toward applied studies of more conventional media as well.

12. Finally, the U.S. Office of Education reorganize so that there will be one office, section, division, or bureau responsible for educational media. We feel that the argument contending that, since educational media pervades all education, it therefore needs no home or direction in the U.S. Office, is specious. The Council further notes that since an Office reorganization eliminated the Educational Media Branch, there appears to have been a definite deterioration in media application effectiveness; and that some organizational solution to correct this situation is in order. It has become a case of everyone's business being no one's business. We think it would be asking too much to carry out the recommendations presented herein without a much larger and more competent media staff within the U.S. Office. Such a staff cannot be developed without a center in the U.S. Office. The situation is a reverse of the old cliche about war and generals. Educational media/technology is too important in the improvement of education to be left exclusively to civilians.

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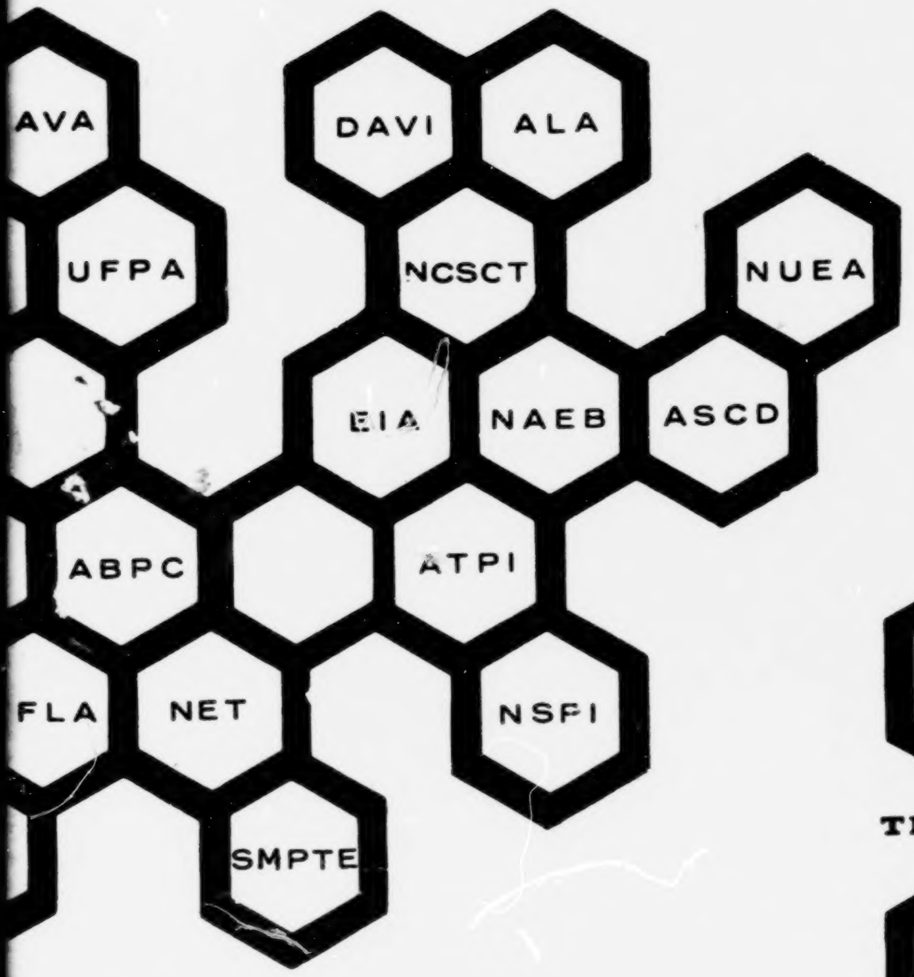
APPENDIX A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The EMC Educational Media Council

FINAL REPORT

Project No. 5-0080
Contract No. OE 5-16-032

A STUDY OF THE CONCENTRATION OF EDUCATIONAL MEDIA RESOURCES TO ASSIST IN CERTAIN EDUCATION PROGRAMS OF NATIONAL CONCERN

PART II: EDUCATIONAL MEDIA AND VOCATIONAL EDUCATION

May, 1967

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE

Office of Education
Bureau of Research

DEVELOPING THE VOCATIONAL COURSE

Robert F. Mager
and
Kenneth M. Beach, Jr.

PREFACE

Within the pages of this booklet will be found perhaps the very first attempt to make available to the vocational educator the essence of modern educational development... in language that he can understand. Much has happened during the past fifteen years or so to cause instruction to change from an art toward technology. Where guesswork was the order of the day there are now systematic bases on which to make decisions about what a course should contain in the way of content, about depth of treatment, about selection of procedures, about student evaluation, and about course improvement.

This booklet doesn't say it all. To do so would require book-length treatment of each of the steps described. But Mager and Beach have done an excellent job of describing succinctly each of the steps involved in the systematic development of instruction. They have provided examples from a variety of fields, and have included references that will help the reader expand his competence. Perhaps most significantly, the material is presented in plain English. This is no small favor in an age where pedantic ponderosity seems to be the order of the day, where the burden of understanding is placed so often squarely on the reader. It is no trick or accomplishment to say things that no one will understand. It is something of an accomplishment to be able to say things in a way most people will understand, and that is what we believe the authors have done in this booklet.

The steps of the instructional technology described in these pages are the steps used by some of the best known training consulting firms, by trainers in industry, and by some elements of the military. The procedure is as applicable to academic as to vocational areas, and its use is certain to lead to course improvements.

Vocational and Technical Educators are in a position to become leaders among professional instructors. That they should act to do so is timely... the tools are at hand. This is one of them.

James D. Finn, Chairman
Vocational Education Committee
Educational Media Council

FOREWORD

When we consider what qualities a good teacher should possess or what qualities make for a successful teacher, the answer is fraught with difficulty. Qualities such as sincerity, efficiency, courage, resolution, energy, tact and personality all spring to mind: the list is seemingly endless, and even after having compiled it no one really is sure of how it can be used.

A more useful approach is to consider what a teacher actually does; in other words to adopt a functional rather than a qualities approach, and then to make sure that these functions are carried out in the most efficient, effective, and economical manner possible.

Basically there are but two kinds of activity in which a teacher can engage; teachers either manage learning resources or else they operate as a resource. Bertrand Russell put this neatly when he said:

> "Work is of two kinds: first, altering the position of matter at or near the earth's surface relative to other such matter; second, telling other people to do so. The first kind is unpleasant and ill paid, the second is pleasant and highly paid."

The moral should not be lost on teachers!

When a teacher deliberately creates a learning environment in his classroom with a view to realizing pre-defined objectives, he is acting as a manager. When the same person physically teaches in that classroom, he then becomes one of his own resources and takes on the role of an operator. He is saying, in effect, that he is the most appropriate resource available, more appropriate at realizing the objectives than any textbook, workbook, program, film, tape or record obtainable. On some occasions this will probably be true, but too often a teacher decides to engage in talk-and-chalk because he enjoys talking; the decision to be a teacher-operator is taken on the basis of personal preference, rather than on the needs of the learning situation. The danger lies not so much in the fact that teachers operate, we all have to do this at times; the danger lies in the fact that they may do more operating work than they should or the situation calls for.

Since the time available and the capacities of teachers must always be limited, it follows that they should concentrate, as far as possible, upon doing that work which stems from their unique organizational role as managers of resources for learning. Viewed in this way it is possible to isolate and identify the four functions of the teacher-manager:

Planning
Organizing
Leading
Controlling

When the teacher-manager "plans," he attempts to forecast future requirements, define the objectives which will have to be realized, write a syllabus of instruction, determine the order in which topics will be studied, allocate the time available, and budget for the resources involved. Organizing is a far simpler activity. It involves the deliberate creation of a learning environment, and delegation of responsibilities. At the same time, the most effective relationships must be established among the people involved in the educational system.

Probably the most skilled work that the teacher-manager performs, and certainly the most personal, lies in the guidance, encouragement and inspiration which he communicates to his students. In this way, the teacher makes decisions as to how the objectives can best be accomplished, communicates them to his students and then motivates them sufficiently so as to get them to accept responsibility for their own learning. This leadership function is important; well-led students do learn without plans and organization, but -- backed by good plans and organization -- well-led pupils become outstanding. The controlling function is concerned with the need to check performance against previously established criterion, with a view to determining whether or not the objectives have been realized.

These four functions are separate and disparate activities, but together they make up the whole of the educational management process. Such a philosophy introduces the concept of management by results into education, and allows for the formulation of a single theory of instruction capable of providing what the Senate Subcommittee on Economic Progress described as:

> "guiding principles for development and application of educational technology, (which) would contribute immeasurably to healthy development of new systems and would help avoid waste of resources."

Now that the functions of the teacher-manager have been considered, it is possible to consider how the resources that are available to him can be most effectively utilized. For a very long time, most efforts were concerned with polished and elegant attempts to mechanize the process of teaching through the production of teaching and learning aids. Such devices, however, ought to be considered less as aids and more as part of the new technology, promising to transform the present day concepts and methods employed by the teacher.

All too often we have been accustomed to think of things as existing apart from what they actually do or accomplish. We tend to think of the chalk-board, the language laboratory, and the teaching machine as something quite apart from each other and from the system of which they are part. A more meaningful approach is to take a whole view of the learning system, and then to determine how each of the constituent parts interact with each other. Isolated parts can rarely provide adequate information about the system, but the system can certainly provide extremely valuable information about the functions which can or must be fulfilled by each component. Just as an atom can only be described in terms of activity, so can the resources of an educational environment be more fruitfully described in terms of what they do and the role they fulfill in realizing the system's objectives.

Criticisms of these resources have normally taken two rather different lines: either they are feared because they represent weak and debilitating forms of learning experience or else they are feared because they are machines. Bruno Bettelheim has pointed out that the answer to these dangers, if not the criticisms, is not to deny or to neglect the dangers of the situations,

> "not to run away from it by destroying it and depriving oneself of its advantages; but to realize the dangers and meet them with conscious action based upon personal decision. This neutralizes the danger, and lets us enjoy the advantages of technology without letting it deprive us of our humanity."

The decision, however, on whether to use a particular learning or teaching resource can only be based upon an analysis of its characteristics, and how far it is likely to be useful in realizing the objectives of the system. That is what this book is all about.

I. K. Davies
Brampton, England
1966

ACKNOWLEDGMENTS

No work such as this springs full grown from the hand of a single person, and though recognition of the inspiration and assistance provided by others is little enough repayment for their contribution, our appreciation is extended with the greatest of sincerity to:

The many vocational instructors with whom we have talked over the past seven years, who were willing to describe their problems, react to some of the ideas presented here, and to welcome a visit to their facilities;

The members of the Vocational Education Committee, Jim Finn, committee head, Ben Edelman, Trevor Serviss, Desmond Wedberg, and Lee Cochran, who reviewed early versions of the manuscript and offered sound suggestions for improvement, and to Otto Legg, Office of Education, who was kind enough to do likewise;

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Ivor K. Davies, Royal Air Force, whose enthusiasm for the new technology is exceeded only by the quality of his Foreword especially written for this book.

And a deep bow to the power behind the throne, Clarice Kelley, who kept all the horses running in approximately the same direction.

Of course, errors and oversights must be assigned to . . .

R. F. Mager

K. M. Beach, Jr.

DEVELOPING THE VOCATIONAL COURSE

TABLE OF CONTENTS

PREFACE . . . . A-i

FOREWORD . . . . A-ii

ACKNOWLEDGEMENTS . . . . A-v

INTRODUCTION . . . . A-ix

CHAPTER I - THE STRATEGY OF COURSE DEVELOPMENT. A-1

Phase One: Preparation. A-3
Phase Two: Course Development A-4
Phase Three: Course Improvement A-4

Figure 1. - The Three Phases of Course Development A-2
Figure 2. -Steps in Preparation Phase . . . A-3
Figure 3. -Steps in Course Development Phase A-4
Figure 4. -Steps in Course Improvement . . A-5

CHAPTER II - THE JOB DESCRIPTION A-7

CHAPTER III - THE TASK ANALYSIS A-9

Task Listing A-9
Task Detailing A-13

Sample Form: Task Summary Sheet A-12
Task Summary Sheet (Complete) A-14
Task Detailing Sheet A-16
Task Detailing Sheet (Complete) A-20

CHAPTER IV - TYPES OF PERFORMANCE A-22

Discrimination. A-23
Problem Solving A-23
Association A-24
Manipulation A-25

CHAPTER V - THE TARGET POPULATION A-27

Education A-27
Motivation A-27
Interests A-27
Attitudes, Biases, and Prejudices . . A-28

CHAPTER VI - COURSE OBJECTIVES A-30

CHAPTER VII - THE COURSE PREREQUISITES A-35

Examples of Prerequisites A-37

CHAPTER VIII - MEASURING INSTRUMENTS A-38

Prerequisite Test A-38
Post-Test A-38

CHAPTER IX - THE LESSON UNIT A-43

Sample Form: Lesson Unit Objective A-44

CHAPTER X - SELECTION OF INSTRUCTIONAL TECHNIQUES A-45

Characteristics of Instructional Procedures and Materials A-45
Advantages of Instructional Procedures and Materials A-46
Selecting Appropriate Procedures . . . A-46

CHAPTER XI - LESSON PLAN DEVELOPMENT . . . A-51

Sample Form: Lesson Plan A-52
Lesson Plan A-53

CHAPTER XII - SEQUENCING OF INSTRUCTIONAL UNITS A-54

From general to specific. A-54
Interest sequencing. A-54
Logical sequencing A-54
Skill sequencing. A-55
Frequency sequencing A-55
Total job practice. A-55

CHAPTER XIII - IMPROVING COURSE EFFICIENCY . . . A-56

CHAPTER XIV - IMPROVING COURSE EFFECTIVENESS. . A-58

CHAPTER XV - SOURCES OF INSTRUCTIONAL MATERIALS A-61

Guide to information on Specific Procedures, Materials and Devices A-61
Selected Instructional Information:
  Instructional Techniques and Media . . . A-63
  Programed Instruction. A-64
Sources of Vocational-Technical Instructional Materials A-64
Periodicals and Journals A-68

REFERENCES A-69

APPENDIX A-71

INTRODUCTION

This booklet is designed to aid the skilled craftsman to prepare a course through which to teach his craft, to aid the experienced instructor who finds it necessary to prepare a new course, and to aid the experienced instructor interested in improving his present courses in vocational or technical education.

The booklet is not intended to be a dissertation on learning theory or an exposition of educational philosophy. It is not designed to prescribe WHAT to teach. It is designed to help develop a course in a vocational or technical field, according to systematic procedures developed in the research laboratory and tested in the classroom.

Our assumption is that you are interested in turning out graduates who can perform effectively on the job, and that you are interested in being able to demonstrate your success as an instructor. Our concern, therefore, will not be with what is easiest to do. Our concern will be with what is the professional thing to do ... in the development of a course that will allow you to prove your success in reaching the instructional goals that you have selected. As the plumber fails if he doesn't stop the leak... as the machinist is useless if he shapes metal but doesn't shape it according to the blueprint ... and as the surgeon fails if he operates but removes the wrong part... so the instructor fails if he goes through all the motions but cannot (or will not) demonstrate that his students can perform according to the course objectives.

Teaching is facilitating. It is helping the student do something better, or faster, or more reliably, than he could do it by himself. (The "teacher" who does not facilitate learning is of questionable value.) Our goal is to describe the steps involved in developing a course that can be demonstrated to facilitate learning. Probably better than anyone else, people like yourself realize that there can be just as big a difference between practicing a skill and teaching it, as there can be between telling and teaching. Our goal is to help you to become as expert in the craft of systematic course development as you are in the practice of your own vocation.

R. F. Mager

K. Beach, Jr.

CHAPTER I

THE STRATEGY OF COURSE DEVELOPMENT

How would you go about setting up a plant to manufacture a particular product? Would you begin by ordering machinery? Would you begin by setting up a production line? Would you begin by hiring people?

Or would you begin by insisting on seeing a detailed blueprint of the product you were setting out to produce?

What is usually meant when someone says that he performs his job systematically? Does it mean that he picks a tool at random from his toolbox? Does it mean he tries the first thing that came to his mind? Does it mean he uses the same tool for every job?

Or does it mean that he first analyzes the problem, decides exactly what result he wants to obtain, selects and applies the tool most suitable to getting the desired result, and then checks to see that the result has actually been obtained?

The systematic development of a course is accomplished by a procedure implied in the paragraph above. It involves detailed specifications of the desired result (in the form of a course graduate), development of an instrument by which success can be measured, development of procedures, lessons, and materials designed to achieve the specified result, and it involves steps to insure the continual improvement of course effectiveness.

In the pages to follow we will describe the three major phases of course development, and outline the steps in the accomplishment of these phases. Some of the steps are easier to perform than others, and some of the steps are more familiar than others. But even though some of the steps ask you to things you may not have done before, the overall process is one with which you are already familiar. The reason for this is simply that systematic course development is no different than systematic development of an airplane, or systematic design and construction of a building, or systematic performance of the tasks associated with your own profession. The tools are different, but the procedure is the same.

Essentially this procedure asks us to:

1. Determine and describe what it is we want to achieve,
2. Do what is necessary to achieve the desired result, and
3. Check to see that we have succeeded in doing what we set out to do.

In developing a course this means:

1. Developing the detailed objectives,
2. Developing lessons and materials designed to meet these objectives and trying out the course, and
3. Determining how well the objectives were achieved and improving the course to improve the result.

Regardless of subject matter, the object of a vocational course is to (1) send the student away capable of performing satisfactorily on the job, and (2) capable of improving his skill through further practice. To achieve the first goal it is necessary to know what the job consists of, what one needs to do to perform each of the tasks, how frequently each of the tasks are performed... and it is necessary to provide the student with practice in performing these tasks under conditions as much like the job as possible. To reach the second of these objectives (improving skill through performance), it is essential that the student be taught enough about each task so that he can tell the difference between doing it right and doing it wrong (discriminate between perfect performance and imperfect performance), so that he can evaluate his own attempts to perform each of the job tasks. You see, experience is no teacher at all unless it is accompanied by information about the accuracy of the performance. Therefore, for the student to be able to improve with practice it is necessary that he be able to recognize good performance and bad performance when he sees it, whether he sees it in others or in himself.

The strategy of developing a vocational or non-vocational course, then, is one that calls for job orientation rather than subject matter orientation. The strategy is to use the job as the basis for deciding what will be taught and in what order and depth, rather than simply to present as much subject matter as possible in the allotted time.

The three phases of course development include preparation, development, and improvement. Each phase includes several steps; a general description of these steps is provided below. Accomplishment of the steps will be considered in more detail in the following chapters.

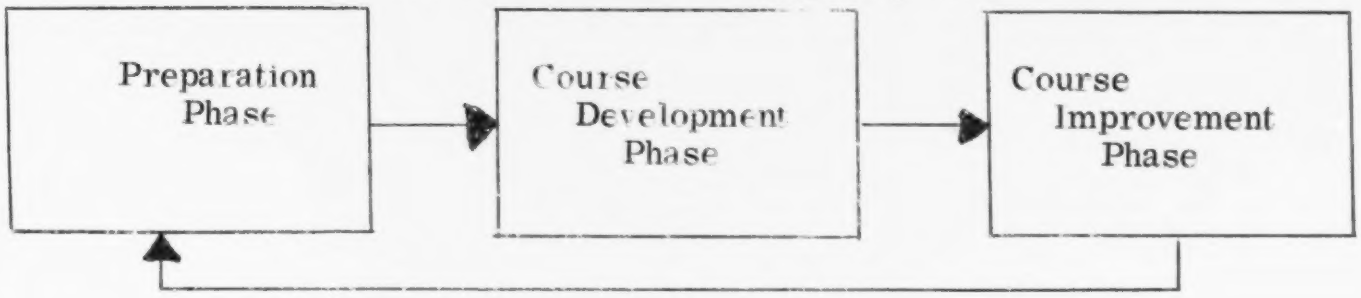

Figure 1.

The Three Phases of Course Development

Phase One: Preparation

The steps of the preparation phase (shown in Figure 2) are designed to insure that all of the information, and practice, necessary to perform the job are included in the course. They are the steps leading to the systematic determination of course objectives, and begin with the job itself rather than with content. The first step is describing in general terms that which someone does when performing the job. The second step is to describe job performance in finer detail, listing each of the tasks (task analysis) of which the job is composed, and describing the steps in each of these tasks. Then the student population is described, as it exists. Course objectives are

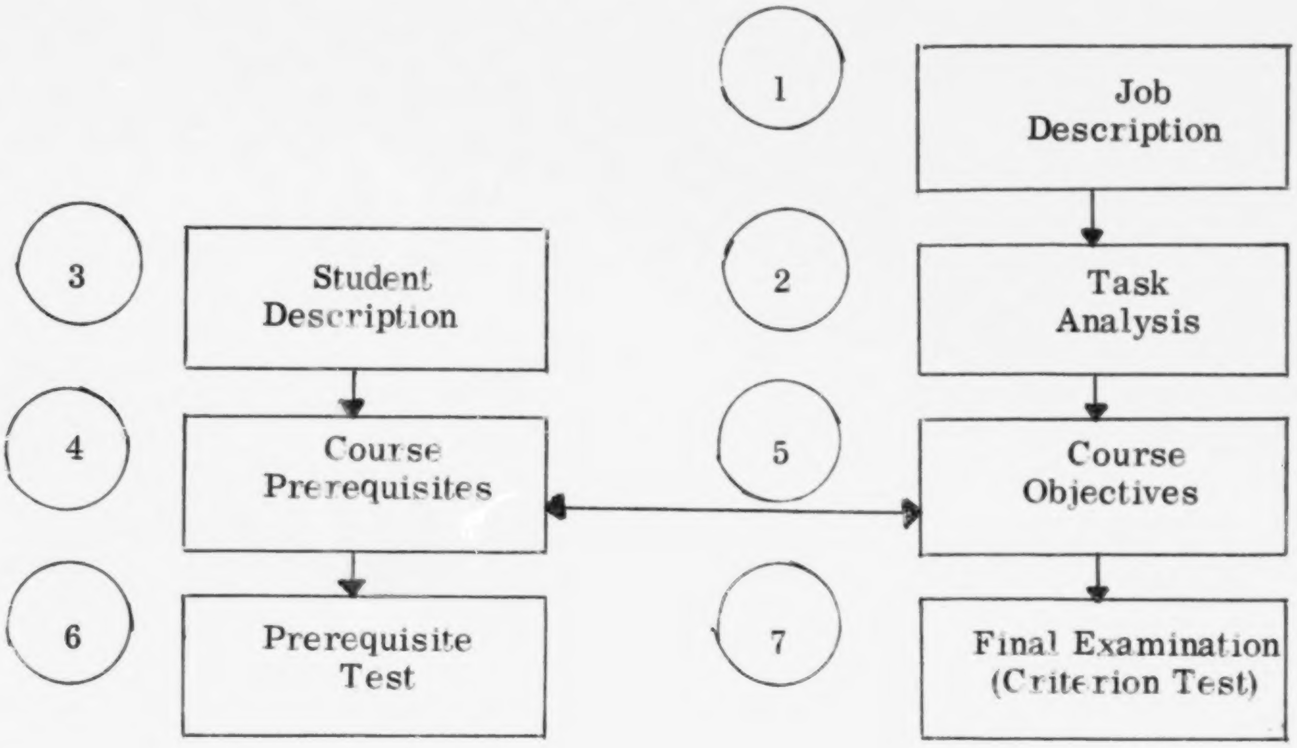
1
Job Description
3
Student Description
2
Task Analysis
4
Course Prerequisites
5
Course Objectives
6
Prerequisite Test
7
Final Examination (Criterion Test)

Figure 2.

Steps in Preparation Phase

developed from the task analysis, and assumptions about what students must be able to do upon entering the course are turned into statements of prerequisites. The final step of the preparation phase is that of preparing measuring instruments (examinations) with which to measure success. The final examination (similar to final inspection) is developed strictly from the course objectives, and the prerequisite test (entering skill test) is developed strictly from the course prerequisites.

Phase Two: Course Development

Course development begins by outlining instructional units in terms of job tasks, so that at the end of each unit the student will be able to do something that he couldn't do before, thus improving continued motivation of the student. The next step is to identify the type of learning required for each of the steps of each of the tasks, so that intelligent decisions may be made about which instructional technique is most appropriate for the teaching of each task, and so that intelligent decisions may be made about the selection of instructional aids and devices. Lessons are then outlined and content is filled in, to insure that what is taught is what will enable the student to perform the task. Instructional procedures and materials relevant to each lesson are then listed, and an appropriate selection is made. Lesson plans are then completed and sequenced according to guides that will make the student most useful in the least amount of time, most interested in completing the course, and that allows logical development of the subject (from the student's point of view). The final step in course development is the initial tryout of the course itself.

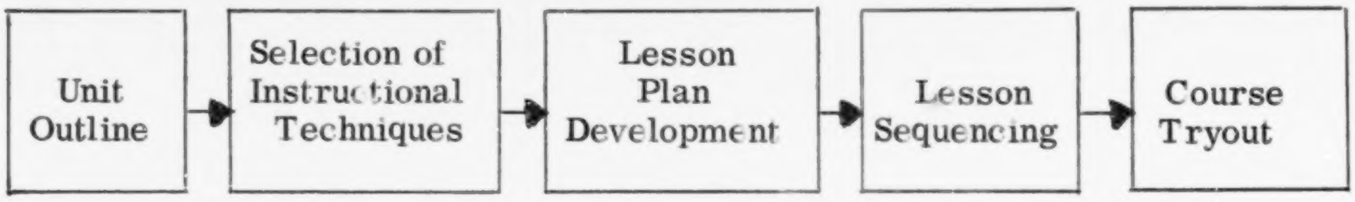

Figure 3.

Steps in Course Development Phase

Phase Three: Course Improvement

The professional instructor never stops improving his course any more than the professional physician stops improving his skills. Vocations change, new teaching techniques and devices become available, and the average characteristics of the incoming student frequently shift. It is thus appropriate to set in motion a process guaranteeing that the course will be continually as fresh and up-to-date as this morning's newspaper. This is probably the simplest part of the development process, and involves checking to see how well the instruction meets the objectives, and checking to see how well the objectives continue to meet the job. Indicated modifications are then made, and another tryout is conducted (Figure 4).

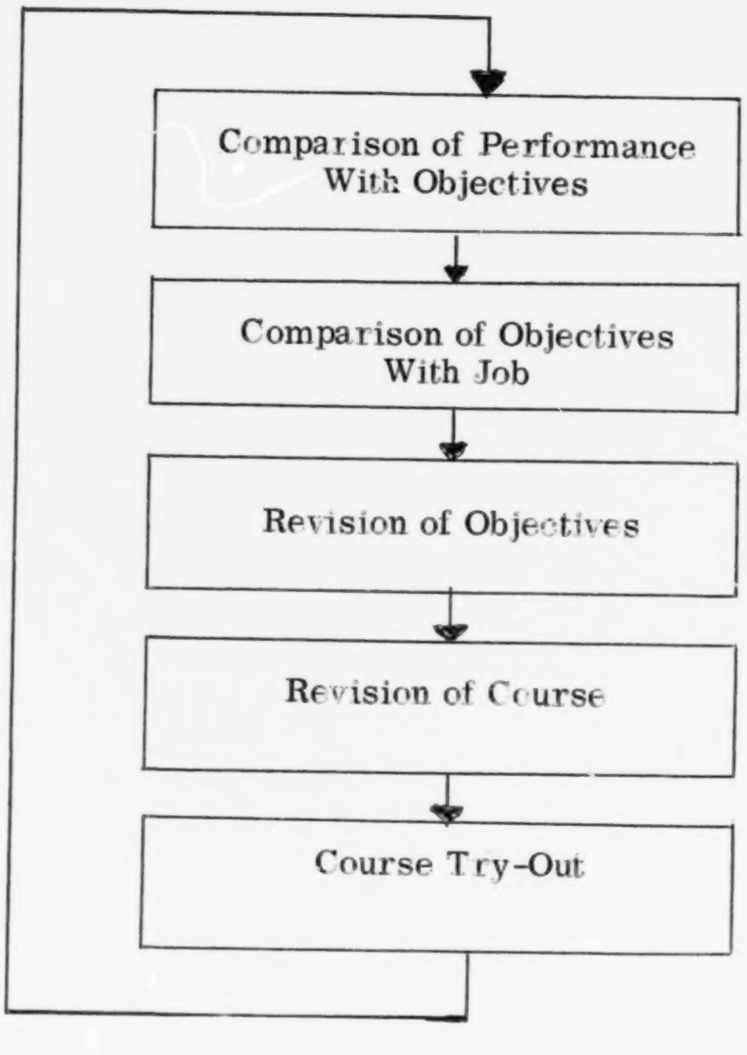
Comparison of Performance With Objectives
Comparison of Objectives With Job
Revision of Objectives
Revision of Course
Course Try-Out

Figure 4.

Steps in Course Improvement

The following pages describe each of the above steps, and provide an assortment of examples. Though the steps are described in sequence, it is not meant to imply that any step is completed and then left unmodified. In practice it is often necessary to modify what was done in earlier steps in light of what develops in later steps.

One final comment. While the systematic development of a course is a specific procedure that can be described in detail, the procedure is not specific to subject matter or vocations. Regardless of the vocation chosen, the procedure in developing the course is basically the same. This procedure applies to the development of nonvocational as well as vocational course material.

CHAPTER II

THE JOB DESCRIPTION

From the very beginning it is appropriate to adopt a job-oriented point of view, so that only the most relevant subject matter and learning activities are built into the course.

The first step, therefore, is to locate, or write, a job description. A job description is a general statement about what a person on the job does, and tells something about the conditions under which he does them. It is NOT a description of what he knows. A job description is generally only a paragraph or two long.

If you cannot locate a job description, write one. Think about doing the job, and list the various tasks that are involved and any peculiar conditions under which the task is carried out. For example, a description of the plumber's job would probably indicate that he often has to work in confined places, and in the customer's house. A radio announcer has to work under time pressure, and a waiter is expected to be polite to his customers.

One note of caution. It is important to include ALL classes of things that are done on the job, even though they don't relate to the basic skill. For example, if the job you will be teaching is that of auto mechanic, and if the mechanic on the job is required to fill out certain forms or to do other paper work, include that fact in the job description. If the man on the job is expected to give an occasional guided tour through the work area, include that. A job description describes the job as it is... not as you would like it to be.

EXAMPLE 1

VOCATION: MACHINIST

The machinist is a skilled metal worker who shapes metal or nonmetal parts by using machine and hand tools. He is able to select the proper tools and materials required for each job, and to plan the cutting, bending, etc. and finishing operations in their proper order so that he can complete the finished work according to blueprint or written specifications. He is able to interpret blueprints and read precision measuring instruments. He is able to convert fractional values into decimal equivalents.

The machinist is able to set up and operate most types of machine tools. He selects the appropriate machine and cutting tools that will turn raw material into an intricate, precise part.

EXAMPLE 2

VOCATION: RADIO AND TELEVISION SERVICE TECHNICIAN

A radio and television technician may be required to install, maintain and service amplitude and frequency modulated home and auto receivers, transistorized radios, monochrome and color television systems, high fidelity amplifiers and tape recorders. He is able to read circuit diagrams, codes of values, and to select component substitutes.

His work will require meeting the public both in the repair shop and on service calls. In order to service home receivers or equipment he may be required to drive a car or truck. He must be able to tolerate heights, as antenna installations on rooftops are often an everyday occurrence. A serviceman who establishes his own business will also need to know how to maintain business records and inventory.

EXAMPLE 3

VOCATION: WELDER

The welder possesses a great deal of manipulative skill both in the art of welding and in his knowledge of jig preparation, symbols, metallurgy and blueprint reading. He is able to join two pieces of metal by arc, gas and spot welding in order to form one precision part. He is able to specify the type of metal that will most likely meet blueprint specifications. Since there are many ways to weld, he selects the method that will yield a satisfactory finished product.

In addition to understanding the principles of welding, the welder is able to operate sheet metal tools. He is able to shear, brake, and manipulate sheet metal before joining. He is also experienced in silver and lead soldering techniques. In essence, he is able to construct, join, and finish two pieces of metal according to blueprint specifications; to repair broken or perforated members.

The job description is adequate when it contains a comment about each of the kinds of activities a person engages in during his performance of the job, and when it suggests the special or unusual conditions associated with the performance of the job.

CHAPTER III

THE TASK ANALYSIS

The job description sketches the outlines and "high spots" of the job to be taught, but isn't a good enough basis from which to develop a course. It isn't specific enough, and so the task analysis is the next step.

A task is a logically related set of actions required for the completion of a job objective. Stated another way, a task is a complete job element; a job or vocation includes a number of tasks. For example, one of the tasks that must be performed by the auto mechanic is that of changing a tire. All of the steps involved in tire changing go to make up the complete task. One part of the salesman's job is to make out orders. That is one task that makes up the salesman's job. Preparing a batch of mortar is one task making up the mason's job.

1. Task Listing

The first step in the task analysis is listing all of the tasks that might be included in the job. You can probably list most of them just by thinking about the job awhile, and by looking at your job description. But you will do a better job if you do not stop there. Talk with individuals now working at the job, or watch them actually doing the job. This will help refresh your memory, and help keep you out of the teaching trap of loading the course with irrelevant content.

Talking with the man on the job will tell you what the job is. Talking to the supervisor will tell you what it ought to be. You will have to use your judgment as to which tasks are reasonable to include in your list based on probability of need.

A note of caution. You will not be teaching all of the tasks you list in your analysis. Some will be crossed off for reasons we will explain later. Now the important thing is to list all the tasks that go to make up the vocation.

Here are two examples of what such a list might look like. The first is taken from Harless (1966).

EXAMPLE 1

VOCATION: SERVICE STATION MECHANIC-ATTENDANT

1. Cleans or replaces spark plugs
2. Adjusts and bleeds brakes

3. Replace wheel cylinders
4. Inspects and flushes radiators
5. Tests anti-freeze
6. Repairs tube or tubeless tires
7. Rotates tires
8. Lubricates vehicles
9. Balance tires
10. Replaces air cleaners
11. Cleans or replaces gas filters
12. Washes and waxes autos
13. Sells auto accessories
14. Replaces oil filters
15. Checks oil, brake fluid, power steering, etc.
16. Washes windshields, replaces blades
17. Fills gas tanks, radiators
18. Keeps daily records of sales, inventory changes
19. Orders supplies
20. Opens and closes station

EXAMPLE 2

VOCATION: PAINTER

1. Refinishes old as well as new surfaces
2. Refinishes wood, metal, glass, concrete, and brick
3. Selects paint, varnish, lacquer or other types of finishing material
4. Selects appropriate brushes and rollers

5. Removes trim and obstacles before finishing
6. Removes existing finish from surfaces when appropriate
7. Scrapes, sands, and cleans surfaces to be finished
8. Fills cracks and holes with appropriate substitutes
9. Mixes and thins finishing material to correct consistency
10. Adds color to finishing material when necessary
11. Masks areas not to be finished
12. Selects and supplies appropriate ground and furniture covering
13. Selects necessary equipment
14. Operates a "ladder" truck
15. Countersinks nails, brads, and other obstructions
16. Waxes, and replaces doors, drawers, etc. when finished
17. Acts as a consultant to the public
18. Cleans area when finished
19. Orders supplies
20. Maintains records of previous jobs, colors, materials, etc.

It will be useful to list all these tasks on a simple form, so that you can easily record the information you need to put down next. As you can see by the sample form on the next page, there are three columns to the right of the place where each task is listed.

The first column is headed "Frequency of Performance," and is where you should indicate how often each task is performed during the performance of the job. When filling out this column, try not to think about whether the task is important or unimportant, just indicate the frequency with which the task is performed. Make up a recording scheme that fits your own subject matter; for some occupations it is reasonable to write down the number of times a particular task is performed each day, each week, or maybe even each month. Whether you record the actual number of times a task is performed during some given length of time, or whether

TASK SUMMARY SHEET

VOCATION: ______________________________

NO.	TASK	FREQUENCY OF PERFORMANCE	TASK IMPORTANCE	LEARNING DIFFICULTY
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				

you merely indicate whether the task is performed frequently, once in awhile, or very rarely, this information will become very useful in deciding on how deeply to go into the subject, how much practice to provide, and how to sequence the course lessons.

The second column is labeled "Task Importance." All tasks are not equally important in the performance of a job, and in this column you should indicate the relative importance of the task in the practice of the vocation. You can readily see why frequency and importance are listed separately. Some tasks, while performed very rarely, are critical to the practice of the vocation. On the other hand, tasks which are performed frequently may not represent a critical skill in the practice of the vocation. For example, while a waiter must know how to clean off a table, and while he may perform this task frequently, it is not nearly as important as his ability to take the customer's order correctly.

Since all tasks on your list are of some importance (or they wouldn't be there), it is enough that you label each of the tasks 1, 2, or 3 to indicate your judgment of importance. You will then be able to tell which tasks _must_ be included in the training, and which may be left out if some kind of selection becomes necessary.

The third column of the form is labeled "Learning Difficulty," and is a column you should fill in while looking yourself straight in the eye (which is a neat trick without a mirror). Here your best estimate is required of whether each task is easy to learn, moderately difficult to learn, or very difficult to learn. The accuracy with which you can make these judgments is largely influenced by how long it is since you yourself learned the tasks. If you recently learned to perform these tasks you are a good judge of their learning difficulty; if it has been quite awhile since you learned them, it would be wise to consult with a student or two. As you well know, people who can do things well frequently forget how difficult it was to learn to do them.

Another note of caution. The purpose of a form is to make a task easier. If the forms we offer as aids do not facilitate your recording the details of the tasks you will be teaching, then change them to fit your needs. Do not distort your description of the job just to fit the forms.

On the next page is an example of what your task form might look like when completely filled out.

2. _Task Detailing_

With a list of the tasks included in the job you are well along toward developing a sound basis from which to evolve the course objectives. But it is necessary to be even more specific if all available information about systematic course development is to be used.

TASK SUMMARY SHEET

VOCATION: ELECTRONICS TECHNICIAN

NO.	TASK	FREQUENCY OF PERFORMANCE	TASK IMPORTANCE	LEARNING DIFFICULTY
1.	Troubleshoots and repairs malfunctioning equipment.	An everyday occurrence	1	Difficult
2.	Reads electronic schematics.	1 to 10 times a day	2	Moderate
3.	Performs chassis layouts.	One per week	2	Easy
4.	Uses small hand tools.	Continuously	1	Easy
5.	Checks electronic components.	Frequently	1	Moderate to very diff.
6.	Replaces components.	Once in awhile	2	Easy to moderate
7.	Solders various components.	Frequently	2	Moderate
8.	Recognizes the applicability of electronic test equipment.	Once in awhile	2	Difficult
9.	Interprets test instruments.	Frequently	1	Difficult
10.	Performs calibration of test equipment.	Once a month	3	Difficult
11.	Interprets and records test data.	Once in awhile	3	Easy to moderate
12.	Specifies and orders electronic components.	Frequently	3	Easy
13.	Applies first aid procedures.	Very rarely	1	Moderate
14.	Maintains and cleans work areas.	Frequently	2	Easy

To get a sound grip on the kinds of learning that will have to take place the second step is to list the steps involved in each of the tasks on the list, in terms of what the person does when performing the step. If this step is left out it is possible to fall into one of two teaching traps. One is the trap of spending a lot of time teaching something that is difficult to teach, even though it is not one of the highly important things to teach. That is, it is possible to spend more and more time teaching a difficult, but relatively unimportant topic. Knowing in detail what the job consists of will help avoid this trap.

The other trap is that of forgetting to include in the course something that is very easy to teach, but that is absolutely essential to learn. For example, it is essential that a missile repairman be able to locate each of the units he might be expected to work on (he can't fix it if he can't find it). Since the location of parts is such a simple thing to teach, one course we know of simply assumed that the student "couldn't possibly get through the course without learning the location of the units." The fact is, though, that the students could, and did, graduate without being able to find many of the things they would be expected to repair. By knowing in detail what the job involves it is less likely that essential, but easy to teach items, will be accidentally left out of the course.

The second step in the task analysis, then, is to list each of the steps involved in performing each of the tasks, in terms of what is done, rather than in terms of what must be known. Again we offer a simple form on the next page that may prove helpful in performing this step, and following are some examples of tasks that have been broken down into their main steps.

EXAMPLE 1

VOCATION: ELECTRONICS TECHNICIAN

TASK: Soldering Components

1. Identify joint to be soldered
2. Select the appropriate iron and solder
3. Clean joint and tin if necessary
4. Place the iron on the joint
5. Apply the appropriate amount of rosin core solder to the joint
6. Check and examine the joint; seal if necessary
7. Clean surroundings and replace tools when finished

TASK DETAILING SHEET

TASK: ______________________________

NO.	STEPS IN PERFORMING THE TASK	TYPE OF PERFORMANCE	LEARNING DIFFICULTY

EXAMPLE 2

VOCATION: SERVICE STATION MECHANIC-ATTENDANT

TASK: Clean and Replace Air Filter

1. Identify the type of cleaner to be used
2. Remove filter assembly
3. Drain and clean cartridge and filter holder
4. Refill bowl with clean oil
5. Reassemble unit into mount
6. Check for performance
7. Clean area and replace tools

EXAMPLE 3

VOCATION: SERVICE STATION MECHANIC-ATTENDANT

TASK: Clean and Replace Spark Plugs

1. Note the plug location relative to the cylinder; remove plug covers, leads
2. Remove all spark plugs
3. Identify the type of plugs
4. Decide whether to clean, adjust, and/or replace plugs
5. Adjust and clean plugs if appropriate
6. Reinsert plugs in engine
7. Connect ignition wire to appropriate plugs
8. Check engine firing for maximum performance
9. Clean and replace equipment and tools

EXAMPLE 4

VOCATION: PAINTER

TASK: Refinishing of Wood

1. Identify the type of wood to be refinished
2. Select appropriate paint or finish remover
3. Remove old finish with appropriate remover
4. Sand and fill where necessary
5. Apply stain, sealer, or other agent
6. Apply finish coat of lacquer, paint, varnish or other finishing agent
7. Smooth and polish when dry
8. Repeat above steps as often as required for quality finish
9. Check for color, smoothness, and completeness
10. Clean work area and equipment

Here again we can offer some help to make the job of task detailing easier. Each task has some steps in common. For example, the skilled craftsman needs to be able to recognize when a task needs to be performed, and he must be able to recognize when he has performed the task correctly or successfully. These are important aspects of every task and must not be neglected in the design of the course.

Beyond that, there are some steps that may or may not be part of a task, such as knowing (being able to list) the proper sequence of steps to be performed.

To help you as a memory aid, here are some steps that might be included in the performance of a task:

a. Recognize when to perform the task.

b. Select appropriate tools and materials.

c. Locate the correct objects on which to work.

d. Perform the safety procedures associated with the task.

e. Check work.

Some of the steps often included in the performance of a task, but which are not visible while they are being performed, are these:

a. Identify the sequence of steps that must be followed to perform the task correctly.

b. Describe how ________________ works.

c. Describe the theory of why ______________ works.

d. Recognize dangers associated with performing the task.

e. Recognize the difference between a properly performed task and an improperly performed task.

Though these are things that cannot be directly seen, there are ways of detecting whether they can be done properly. Though they cannot be seen directly, they are nonetheless important steps in the accomplishment of many tasks.

After the steps in each task have been listed it is appropriate to fill in the two remaining columns on the detail sheet. Since it is likely that the identification of the type of learning involved in each step is new to you, we will discuss that in a separate chapter to follow. At the moment we will say only that the information in that column will be of critical importance in deciding which teaching technique is appropriate at each step.

The column labeled "Learning Difficulty" is similar to the one on the sheet on which you have listed all the tasks. There is one difference, however. It is very likely that the student will be already able to perform some of the steps when he arrives for the course. As we do not want to bore the student by teaching him what he already knows, we will want him to perform the things he can already do only when he is asked to perform the entire task; we will not teach him these steps separately. Thus, whenever a step is found that the student is very likely to be able to perform, put a special mark in the learning difficulty column. For the remaining items, indicate whether they are easy to learn, of moderate difficulty, or difficult to learn. On the next page is an example of how one of your task sheets might look when filled out.

While this may seem to be going into unnecessary detail, it must be stressed that these steps are essential in making intelligent choices of teaching techniques. With the task steps identified in this detail we can

TASK DETAILING SHEET

TASK : Clean and Replace Spark Plugs

NO.	STEPS IN PERFORMING THE TASK	TYPE OF PERFORMANCE	LEARNING DIFFICULTY
1.	Note the plug location relative to the cylinder.	Association	Easy
2.	Remove all spark plugs.	Manipulation	Easy
3.	Identify the type of plugs.	Discrimination	X
4.	Decide whether to adjust or replace plugs.	Problem-solving	Moderate difficulty
5.	Clean plugs if necessary.	Manipulation	X
6.	Adjust plugs if appropriate.	Manipulation	Moderate difficulty
7.	Reinsert plugs in engine not relative to cylinder.	Manipulation	X
8.	Connect ignition wires to appropriate plugs.	Association	Moderate difficulty
9.	Check for performance.	Discrimination	Very difficult
10.	Clean tools and equipment.	Manipulation	X

(Note that some of these steps cannot be directly seen, but that they are nonetheless important in completing the task.)

better avoid the teaching trap of including more theory than is necessary or desirable, and keep the course performance-oriented. Without this detail we might add hours or days of unnecessary theory, as was the case in a radar course for which a task analysis was not prepared. This course included a four-hour block of lectures on the theory of wave guides. A wave guide is a piece of metal pipe that serves the same function as a piece of wire, and there is absolutely nothing that can be done with a piece of wave guide that becomes badly dented or for some other reason malfunctions ... except to replace it. Since the object of the course was to develop men who could repair the radar when it developed trouble, lectures on the theory of wave guide construction were completely useless and irrelevant... and served merely to bore and confuse the student. When the managers of the course finally developed detailed objectives based on a task analysis, these theory lectures were eliminated.

There are probably as many techniques for performing a task analysis as there are people doing it. The technique described here, while not nearly as detailed as some, is adequate for the job at hand. If you know of another technique that suits you better, by all means use it. The only large error you can make is to not use any task analysis technique at all.

CHAPTER IV

TYPES OF PERFORMANCE

There may be several instructional procedures from which to choose when developing a lesson. There is, of course, the lecture. There are films, slides, filmstrips, mockups, books, manuals, demonstrations, discussions, recitation, practice, and more. Since all of these procedures are not equally effective all of the time, and since some of them are appropriate some of the time, the question is... how to decide when to use what?

Some teachers decide which to use on the basis of what they are most comfortable with; one may be most comfortable with the lecture while another may feel more at ease with slides and discussion. Though it may be acceptable for amateurs to select their teaching procedures this way, the professional wants a more rational basis for making his decisions. After all, the professional instructor is an individual who can make his selections in a manner that results in efficient instruction. (We would be in a fine fix if the surgeon only performed those operations he is "comfortable" with, and if the carpenter refused to use any tool but the hammer because he "likes" the feel of it.)

Fortunately there is a sounder basis for choosing instructional procedures, and this chapter will discuss the first step.

In the way one selects a tool from the toolbox by knowing what he needs to accomplish, one chooses an instructional procedure by first identifying what kind of performance he wants to develop, by knowing what he wants to accomplish. As Briggs (1965) has pointed out, "The best available basis for the needed matching of media with objectives, is a rationale by which the kind of learning involved in each educational objective is stated in terms of the learning conditions required." There are several different kinds of performance, and different procedures and materials are appropriate for teaching each. For example, a simulator might be highly appropriate in teaching someone to fly a plane, but it would be inappropriate in teaching him how to spell. That much seems clear. But why is this so? It is because two kinds of performance are involved, and one kind is facilitated or made easier by using a simulator and the other isn't. Let's consider the types of performance.

Dr. Robert Gagne, in his book Conditions of Learning (1965), has presented an excellent and scholarly description of eight different kinds of performance, and has attempted to show which conditions are most appropriate for facilitating the learning of each of these performance types. This book is highly recommended to those who are completely serious about developing a course according to the most scientific techniques available.

In an attempt to simplify your job of course preparation, we have modified Gagne's eight categories into only four. The four kinds of performance we have chosen to describe are discrimination, problem-solving, association, and manipulation. If you determine which of these performances is involved in each of your task steps you will be in a position to make a sound selection of instructional procedures and materials.

1. Discrimination (when to do it -- knowing when it's done)

Discrimination means being able to tell the difference between two or more things. When we hear the difference between a good note and a sour note, we are discriminating. We discriminate when we perceive that one object is red and another blue. Discrimination is involved in being able to taste the difference between two cups of coffee, and in telling the difference between a good job and a bad job.

How can you tell when you have a flat tire? You discriminate a difference between smooth driving and lumpy driving. How do you know when a particular task needs to be done? There is something different about the environment than usual, and that causes you to take action. How can you tell when a task has been done correctly, or expertly... how can you tell when the task is finished? You perceive that there is no difference between what was done and what should have been done.

Discrimination performance is best developed by showing the student pairs of things, one that IS the thing you want him to recognize and one that is NOT the thing you want him to recognize, and gradually reducing the difference between the pairs of items.

Look at your Task Detailing Sheets. Whenever you have a step that calls for the student to be able to distinguish one sound from another, to tell when he has done a proper job, to tell when he needs to do a task, to see the difference between correct and incorrect, you are calling for discrimination performance.

2. Problem Solving (how to decide what to do)

Once you discriminate (perceive) that a job needs to be done you normally proceed to do the job. Sometimes, however, you see that something needs to be done, but you can't tell what to do. You may see your TV picture rolling or tearing and you know that something needs to be fixed. What to do? Find the trouble. You can't fix it if you can't find it. The process of finding the trouble is called problem solving, and involves teaching the student procedures that will lead him to locate the trouble.

Whenever a task step calls for the student to figure out the best way of doing something, or to decide what to do next, he is being asked to engage in problem solving. Problem solving is taught by showing the student those cues or symptoms that should lead him to conclude that problem solving is called for, by showing him relationships between these symptoms and possible causes, and by giving him practice on the actual thing or situation needing remedial action. It is done by showing him symptoms and letting him find his way to the trouble. It is NOT done by showing him a trouble and asking him to guess what symptoms would appear. Thus, problem solving on TV sets is better taught on the set itself, rather than through lectures. It is taught best by having the student solve as many problems as possible, rather than by having him talk about it, write about it, or answer multiple-choice questions about it.

3. Association (knowing what to do... knowing why to do it)

If you decided that the dinner table needed to be set, you would immediately know which plates and silverware were needed. If you saw that the meat needed cutting, you would know that a knife was the thing to get and use. These things that you know can be referred to as associations. Either a stimulus or cue in the environment causes you to reply with the information you have associated with that cue, or something you think of causes you to think of something related to it.

Whenever you say that there are some things the student just "has to know" you are asking for performance based on association, or knowledge. When the student is expected to shout out the tools and parts he will need when you say, "carburetor adjustment," one is asking for performance based on knowledge. There is a special class of association called sequencing, or chaining. Sometimes it is essential that a very precise sequence of steps be followed in performing a task. Learning those steps in order is an example of chaining. For example, there is a very precise order of steps that must be followed in performing surgical operations. It is important that those who do this task know which step follows every other step.

The techniques used to teach associations depend on the nature of the association. If a student is to make a certain response whenever he hears a certain sound, a technique must be used that presents the sound, and makes the student respond until he can do it without help. If he is expected to be able to do something whenever he sees a certain thing, then a visual technique is used that shows him the object or cue and allows him to practice the response. If associations are related to knowing how something works, then a demonstration-lecture is appropriate, if followed by practice wherein the student is asked to describe (orally or in writing) the relationships that go to make up the substance of "how the thing works."

Once the problem has been identified, the skilled worker is the one who has learned just which tools and materials are required to solve the problem, and he is able to use the tools and materials in the proper series of steps in performing the task. The highly skilled worker requires a minimum of memory aids to help him remember what to do and when, though such aids might be used whenever they can simplify either the job or the training. The skills involved in knowing what to do, what to use, and the order or sequence in which to perform a task, are skills which the learner has acquired through association. While the actual process of associating is a mental or internal kind of performance, it is quite possible to tell whether this kind of performance is going on. This is essentially the kind of information we obtain through paper and pencil tests. If a girl is able to answer correctly when we ask her which attachment is needed in order to sew a hem, we know she has performed a correct association, we know she has the correct knowledge.

Association is best taught by practice that provides the student with a relevant cue or asks him a question, and requires him to provide the appropriate response or answer. Chaining (where sequence must be learned) is best taught by having the student actually perform the steps of the task. In this way each step that he performs will serve as a cue or a reminder of the step that is to follow. Starting a car is a good example of a sequence that we have learned so well that we never even think about it anymore. Each action causes us to begin doing the next action... in the right order. We learned this sequence by doing it over and over again. While a lecture or demonstration is useful in showing the student what to do, he needs actual practice in order to learn to do it.

4. Manipulation (how to do it)

Knowing what to do isn't always the same as knowing HOW to do it. For example, if you knew that the next step in a task was to go and get a certain tool, you could also do it... because you know how to walk and know where the tool is located. In this case knowing what to do is the same as knowing how to do it.

But you also know that in order to take out an appendix it is necessary to make an incision with a scalpel. But that doesn't mean you know how to do it or where to do it. We realize that this may seem like a trivial point, but it is worth making because instructors sometimes fail to follow theory with practice. Sometimes they behave as though they believe that if the student knows what to do, he also knows how to do it. As a result they do a good job of teaching students how to talk about doing something, but fail to teach him to actually do it.

Whenever your Task Detailing Sheets call for the student to use a tool, make an adjustment, or in some other way interact with the environment, he is being asked to manipulate, to apply his knowledge.

Manipulation is best taught by practicing to manipulate. Through association he will know what to do when using tools, for example, but actual practice with the tools is the best way to teach him how to use them. We could tell you how to ride a unicycle, or we could show you how it is done either by film or by demonstration. None of these procedures would be successful in teaching you to actually do it. We could teach you how to talk about riding a unicycle, or we could teach you how to write essays about it, and we could even teach you how to write songs about it. Again, none of these procedures are likely to result in your actually being able to ride it. Manipulation is taught by providing an opportunity to manipulate under conditions as close as possible to those found on the job.

If you will now fill in the type of performance called for in each step listed on your Task Detailing Sheets, you will have completed the first step in the selection of appropriate instructional procedures. One comment. If you find you do not like the words we have used in describing performance categories, then describe them in a way that makes sense to yourself. Use whatever words you please, but don't slip by the step of identifying performance. If you do, you will find yourself selecting instructional procedures more on the basis of superstition and guesswork than on the basis of rational decision-making.

CHAPTER V

THE TARGET POPULATION

There is one more piece of information required before the course objectives are prepared, and that is a description of the incoming students. While the content and procedures of the course are strongly influenced by a careful analysis of the vocation itself, course design is also influenced by the kind of students that actually show up for the training. The course must be designed for the target population (students) that actually exists. It is foolish and wasteful to design a course without defining the target population, and then to complain that the students just can't "hack it." The major characteristics of the target population constitutes the starting point of the course... the performance called for in the course objectives constitutes the finishing point... and the process of turning the incoming student into the skilled graduate constitutes the course itself. By subtracting what the student already is able to do from what you want him to be able to do, the substance of the course is derived.

Writing a usable description of the target population is not particularly difficult, so long as you confine your description to real characteristics of real students. Suppose a stranger asked you to tell him about the students you have, or expect to have, in one of your courses. What would you tell him? The things you tell him in answer to this question are the things you should write down in your description of the target population. Some of the categories about which you might want to comment are as follows:

1. Education

The kind of education your incoming students have had in the past will have a good deal of influence on the length of the course, examples you can use, vocabulary that will be understood, and on the level of abstraction that might be meaningful.

2. Motivation

Are the students generally eager to learn the occupation you are teaching or is motivation something of a problem? The less motivated you feel they are, the more you will have to concern yourself with keeping the student interested at every step of the course.

3. Interests

What kinds of things are the students interested in? Knowing their interests will help keep them motivated. What are their special skills or aptitudes? What can these people do? What are they likely to be good at? Are they good at fixing cars? Are they short on manual dexterity? The answers to these questions may have some influence on what you can reasonably expect in the way of terminal (end of course) performance from your students, and will assist you in writing realistic prerequisites.

4. Attitudes, Biases, and Prejudices

Does your target population consist primarily of one ethnic group? What are their strong convictions and biases? This information may also influence the kind of examples you can effectively use, and may provide other clues to student motivation.

Here are two examples of what your target population description might look like:

EXAMPLE 1:

Physical Characteristics	Female; 18-40 years of age.
Education	Average of two years of college; above average intelligence.
Motivation	Desire to learn a skill relative to husbands' occupations. Husbands are scientists and engineers.
Interests	Civic activities, local politics. They attend local lectures, and are active in garden and art clubs.
Attitudes, Biases, and Prejudices	They prefer to associate with educated people. They like to think of themselves as educated, but would rather tend to their clubs than to their children.

EXAMPLE 2:

Physical Characteristics	Male; 12-20 years of age.
Education	High School dropouts; below average intelligence.
Motivation	They are eager to learn a trade in order to be accepted into community activities.

Interests	The students are bored with classroom work, but like to work with their hands. The students show a great deal of mechanical dexterity.
Attitudes, Biases, and Prejudices	The students live in a low-class environment. They are from various extractions and interact with fellow students only when necessary.

CHAPTER VI

COURSE OBJECTIVES

All of the information is now available with which to construct the most important document... the blueprint of the student product you want to develop. This blueprint is essential because it will describe what the student is expected to be like at the time he leaves the course; at the time, in other words, that he leaves your influence. It is important because it is the document from which one prepares the measuring instrument (final examination) by which decisions can be made about the adequacy or inadequacy of student performance. It is important because when a modified version is given to the student he will be better able to organize his own activities and efforts leading him to the kind of performance you want to see. It is important because it will provide a document that you can use to demonstrate your systematic development of the course, and that can be used in response to uninformed criticisms about procedures you are using in the course.

The statement of course objectives is a document that consists of as many statements, items, or examples as are necessary to describe the desired behavior of the student at the time he leaves the course. It is prepared in enough detail so that if given to another professional instructor he could turn out a student that could do the kinds of things you want him to do at the proficiency levels you desire. In the way that blueprints are specified in enough detail so that other professionals could use them to make exactly what you have in mind, course objectives are specified in enough detail so that other instructors could teach students to perform the way you want them to.

Course objectives differ from the task analysis in several ways. The task analysis describes the vocation or job as it is performed by a highly skilled person. Objectives describe the kind of performance that will be expected at the end of the course. For example, while a highly skilled person might be able to perform a particular machine adjustment in five or ten seconds without using any job aids to remind him of the steps, it might be unrealistic to expect a course graduate to perform that well on the day of graduation. It might be far more realistic to expect the new graduate to be able to perform the task without the use of job aids in ten or fifteen minutes, because if he can perform all of the steps of the job and if he can determine when the job is properly performed, then practice on the job will improve his proficiency.

The task analysis describes all of the steps carried out in the performance of the occupation, whether or not the student knows how to perform some of these steps before he enters the course. The objectives of the course differ from the task analysis in that they do not include those things that the student already knows.

Another difference between task analysis and course objectives is in the subject matter itself. It may be that some of the skills called for in performing an occupation are either unrealistic to teach in the classroom, or are better taught on the job. An example of this might be the paper work expected of a skilled craftsman. This task is likely to be so different from one location to another and so easy to teach (relatively speaking), that it might be a task better learned on the job.

The key question to ask is this: What kind of things should the student be able to do at the end of the course that will most facilitate his becoming a skilled craftsman in the least amount of time? Another way of putting it is this: What should the student be able to do at the end of the course so that all that stands between the student and skilled performance is practice?

Course objectives represent a clear statement of your instructional intent, and are written in any form necessary to clarify that intent. In practice you will have at least twice as many statements as you have tasks on your task list, and these statements will have the following characteristics.

In the first place, an objective says something about the student. It does not describe the textbook, or the instructor, or the kinds of classroom experiences to which the student will be exposed.

Secondly, an objective talks about the behavior or the performance of students. It does not describe the performance of the teacher, nor does it describe what the student is expected to know or understand. Though you might begin an objective by a general statement such as "the student must understand the operation of the XYZ sewing machine," you would go on to explain what you mean by understanding, by describing what the student will be expected to do to demonstrate your definition of understanding. In some cases he might be expected to answer questions, or to solve some problems, or to describe a procedure, or to construct a gadget. Whatever it is that you mean by understanding would be defined in the sentences to follow the general one. In any case, an objective describes what the student will be doing to demonstrate his achievement of your instructional intent.

Thirdly, an objective is about ends rather than means. It describes a product rather than a process. As such, it describes what the student is expected to be like at the end of the course, rather than describe the means that will be used to get him there. The objective talks about terminal performance rather than course content.

A typical objective will, in addition to telling something about what a student will be doing, describe the conditions under which he will be doing it. In some cases the student will be expected to perform in the absence of any assistance provided by job aids; in other cases such aids are acceptable. In some cases the student may be expected to solve problems with the use of a slide rule or calculator, and sometimes without these items.

The instructional objective also includes information about the level of performance that will be considered acceptable. If a student will be expected to perform a task within five minutes at the end of the course, this will be stated as part of the objective. If his performance at the end of the course is expected to be error-free, or if some error will be tolerated, this would be indicated. In most instances the decision about what performance will be considered acceptable is an arbitrary one. But this is one place where the experience and wisdom of the instructor is most important, because specification of satisfactory performance is one of the unique contributions that can be made only by the skilled instructor.

For convenience it is possible to classify objectives into two broad categories, those that talk about specific performances of the student and those that may be needed to describe his attitudes. For example, if it is important to send the student away more interested in the subject than he was when he arrived, this would be stated in an objective so that the course may be systematically organized to achieve it. In any case, it is important to describe as comprehensively as possible what the student is intended to be like when he leaves the course.

On the pages following are some examples of a variety of objectives. Notice that each is relatively specific and deals with either a single task or with steps within a task. Notice that each tells you what the student will be doing when he is demonstrating that he has achieved the objective, and that each says something about what will be considered as acceptable performance. Notice also that some are stated in a single sentence, and that others are wordier. The form isn't the important thing, what is important is that instructional intent be made clear.

To prepare your own objectives use your task analysis sheets as your guide. You might find it most convenient to write a task at the top of a sheet and then beneath it describe in more detail what the student will be expected to do at the end of the course in relation to that task. If that technique doesn't appeal to you, here is another one used by some instructors. A sheet of paper is divided into three columns and a general objective statement is put in the left hand column. The center column is used to describe the conditions (givens, constraints, etc.) under which the student will be expected to perform, and the third column is used to describe what the student will be doing to demonstrate his achievement of the objective.

As is true with the other steps in systematic course development, each step is not completed and then forgotten. Objectives are written before the course is prepared, but they are continually modified as experience reveals gaps, unrealistic expectations, or other ways in which they may be improved. But the statement of objectives is the key document in the performance of all the remaining steps of course development. It is the blueprint describing the skills and performances we hope to achieve in our students. It is a description of the goal we intend to reach. Unless we know precisely where we are going, we might wind up some place else.

For a thorough discussion of objectives, and for further examples of the different kinds of objectives that might be written, the following references are recommended:

1. Bloom, B. S. (Ed.), Engelhart, M. D., Furst, E. H., Hill, W. H., and Krathwohl, D. R. Taxonomy of Educational Objectives. Handbook 1: Cognitive Domain. New York: McKay, 1956.

2. Krathwohl, D. R., Bloom, B. S., and Masia, B. B. Taxonomy of Educational Objectives. Handbook 11: Affective Domain. New York: McKay, 1964.

3. Mager, R. F. Preparing Instructional Objectives. Palo Alto, California: Fearon Publishers, 1962.

EXAMPLE 1: Given an unfinished metal casting, be able to surface, drill, and tap according to the specifications indicated on the attached blueprint.

EXAMPLE 2: Provided with an outdoor television antenna kit and appropriate tools, be able to install the antenna and correctly connect the input lead to the television set. Performance will be judged correct if the antenna installation is completed according to trade standards, and if the resulting TV picture is free of snow.

EXAMPLE 3: Given a model XYZ sphygmomanometer, be able to take blood pressure to within 0.05 cm. The student must complete five consecutive trials to this criterion.

EXAMPLE 4: Goal: Be able to point out forest fire hazards in a forest area.

Behavior: Identify dangerous conditions by pointing.

Conditions: The student must have access to forest areas, and be exposed to dangerous conditions determined by the instructor.

Criterion: The student must identify nine out of ten danger areas identified by the instructor.

Criterion: Given a descriptive list of dangerous situations, rank order them according to most to least dangerous.

EXAMPLE 5: Goal: Be familiar with technical terms commonly used in nursing.

Behavior: Match term with correct definition.

Conditions: Given list of terms and definitions.

Criterion: 8 correct matches out of 10.

Criterion Test Item: Here is a list of . . .

Behavior: State meaning of sentence containing term diastolic.

Conditions: Given a sentence containing the word diastolic.

Criteria: Essential elements -- rhythmic recurrence
expansion
dilation of heart cavities

Criterion Test Item: Please read the following sentence . . .

CHAPTER VII

THE COURSE PREREQUISITES

Who will be allowed to enter your course?

Will incoming students be expected to be within certain age limits, or to be able to read at a certain rate, or to be able to perform certain mathematical operations, or to be able to operate certain machines? The answer to these questions determines the prerequisites for the course, and the prerequisites will exert some influence on the length of the course and on the need to arrange for remedial instruction. The fewer the restrictions on the entering student, the larger the number of people who will qualify for the course. But at the same time, the fewer the restrictions the more necessary it will be to design the course to provide individualized instruction, since students are likely to be quite different from one another in what they can do when they enter. The more restrictions you place on the entering student, the more likely it is that students can progress as a group. This is not to say that students ought to progress as a group, only that they are more likely to be able to do so if they are very similar in background and skills. The more restrictions that are placed on the entering student, however, the less likely it is that you will find people described by your prerequisites actually existing in the world. The trick is to write prerequisites that are realistic.

The development of realistic prerequisites is not accomplished in a single step. Rather, the prerequisites grow as other steps of course development are carried out. We have found that the most useful procedure for the development of course prerequisites is to keep a sheet of paper labeled prerequisites on the wall before us while developing the course. Every time we find ourselves making an assumption about what we will expect the student to know or be able to do when he enters the course, we write that assumption down on the prerequisite sheet. If we are going to assume that the student can perform something, we turn that assumption into a prerequisite; if we are not going to assume he can do it, then we add it to the course objectives.

As you have probably guessed, we consider absolutely worthless a prerequisite statement that merely gives the name of some course that the student will be expected to have completed. Such a statement is merely an administrative device that has nothing to do with systematic course development. It provides no information on the basis of which intelligent decisions can be made.

If you develop your prerequisites as you go you will be less likely to fall into the teaching trap of imposing irrelevant restrictions, because this is an area where common sense doesn't always coincide with reality. For example, one electronics maintenance course we know of had a prerequisite calling for normal color vision. "Common sense" implied that this was reasonable. After all, some electronic components are color coded, as are some of the wires used in the equipment. The fact of the matter was, however, that several colorblind students completed the course quite successfully. These students had no difficulty performing all of the tasks required of them because none of them required that color-coded components be read. The mistake here was that the prerequisite was based on course content rather than on the course objectives. Since the content included color-coded items, it seemed reasonable that the student should be able to discriminate among these colors. But the tasks the student was called on to perform didn't require that he be able to discriminate among these colors, and hence a colorblind individual performed just as well as one with normal color vision.

The development of course prerequisites, then, is done with the description of the target population and the objectives, rather than with subject matter. For each skill you decide the student must have at the end of the course you must also decide whether you will assume that the incoming student already has that skill or not. If you assume that he does, write this assumption on your prerequisite sheet. If you assume that he doesn't, add it to your objectives. Use your target population description to check the realism of your prerequisites. If your prerequisites begin to describe a population of students that is quite different from those you have said you are likely to get, some adjustments are called for. Perhaps some of the prerequisites should be turned into objectives. The realism of your target population description can be checked by testing some students to determine what they can and cannot do when they enter the course.

To give you some idea about how this is done we will let you in on the stream of thinking we recently went through while deriving a course prerequisite for a course designed to develop electronic technicians.

> "Let's see, now. One of the things we want the student to be able to do at the end of the course is to interpret waveforms on the oscilloscope. O.K., we'll write that down on our sheet of objectives.
>
> Now what will we assume he will be able to do when he enters the course? We'll assume that he knows how to convert kilocycles to megacycles, for one thing. So we'll write that down on the sheet of prerequisites. O.K., now we know he should be able to make some conversions in order to qualify for the course.

Better check that out by looking at the description of the target population... oh, oh, that won't do at all. The target population consists of students who haven't finished high school. It is a sure bet they don't know how to make the conversions we just assumed they could do. Let's scratch that prerequisite... too unrealistic.

Suppose we assume they can add, subtract, multiply, and divide. Can we also assume they can perform a few algebraic manipulations? ... no, not safely.

So. We will assume they can do the simple arithmetic operations, and add that to the prerequisite sheet. But now we will have to add something to our objectives, because they need to know about conversions, and we can't assume they already know this. We will have to add this to the things we must teach."

Here is an example of what your list of prerequisites might look like.

EXAMPLES OF PREREQUISITES:

1. The student must have the ability to use small machine and hand tools. Such tools include an electric drill, saw, pliers, hammer and chisels.

2. The student must be able to read at the fifth-grade level.

3. The student must be able to work in environments of extreme cold and hot climates, from -20° to +98° Fahrenheit.

4. The student must be physically fit, and cannot have physical handicaps of the type that would restrict the student from job duties.

5. Assume knowledge of basic arithmetic operations including addition, subtraction, multiplication, and division.

6. Student must be interested in working outdoors.

7. Normal color vision is desirable, but not essential.

8. Student can work on the roof of a house or apartment building without getting dizzy.

9. Assume that the student has, or can obtain, a valid driver's license.

10. Assume that the student's biases or prejudices are not so strong as to prevent him from interacting with a wide variety of customers.

CHAPTER VIII

MEASURING INSTRUMENTS

Prerequisite Test

If the design of your course is based on the documents you have developed so far, then it *matters* whether students can actually do the things you have assumed they can do. If it matters, then it is important to determine whether incoming students have the skills required for successful completion of the course. To find out, prepare a test based solely on the prerequisites. Develop items that answer the question, "what must the student do to convince me that he has the skills I have assumed he has?"

Administer this test to students as they enter the course. If very few or none of the students can perform according to one of your assumptions, and if such performance is necessary, you have only two choices. You can either send the student away for some remedial instruction before you allow him into the course, or you can decide to teach him the missing skill. When you decide on the second alternative, erase the skill from your prerequisite sheet and add it to your objectives.

When students come into a course in various stages of under-preparation, the normal response is to provide remedial instruction. But students *also* enter in various conditions of over-preparation. That is, they frequently know more than the prerequisites assume. In this case remedial action should be applied to the course itself so students will not be bored by having to learn what they already know.

Post-Test (Criterion Examination)

As the prerequisite test is constructed solely from the statement of prerequisites, the post-test or final examination is constructed solely from the course objectives. The object is to determine how well the student's performance at the end of the course coincides with performance called for in the objectives. The object is *not* to see how well the student retains whatever he happened to be told during the course. The difference is an important one. It is possible to rank students at the end of a course according to how much they learned (this is a typical technique in an academic course). Or, you can evaluate each student on the basis of how closely his performance approximates the performance called for in the course objectives. In this case the concern is not with comparing students against *each other* . . . the concern is comparing each student against a predefined criterion.

This orientation influences the way in which test items are constructed. It calls for the creation of test items that will determine whether or not the student can perform as required, rather than for test items that are "difficult" enough so there will always be some students who fail. For example, if one of the objectives of the course calls for the student to be able to change a tire with a certain set of tools within two minutes, then the appropriate test item is to ask him to change the tire with those tools within two minutes. If all students can perform as specified, it is wrong to arbitrarily make the test item more difficult. If none of the students can perform, one does not make the test item easier... instead, the instruction is improved. After all, the object is to be in the business of teaching students, rather than to be in the business of failing students.

In the preparation of the criterion examination the following guidelines are offered.

1. Use the objectives as your guide. Prepare as many items as necessary to find out how well the student meets each objective. In some cases only one item is appropriate, as in the tire-changing example above. In other cases you may feel that several items are needed to make an assessment.

2. Create items that call for the same kind of behavior specified in the objective. If an objective calls for a student to use a certain tool, then create test items that cause him to use the tool. In such a case it would not be appropriate to ask him to write an essay about the use of the tool, or to answer multiple-choice questions about the use of the tool. If an objective calls for an ability to repair something, then the appropriate test item is one that asks the student to repair. Again, multiple-choice items are not appropriate. If an objective asks the student to be able to talk about something rather than do it, then an oral item or essay item is appropriate.

On the following pages are examples of objectives and some test items that would be appropriate for testing the objective as well as some test items that would not be appropriate. Items that are appropriate for testing the objective are checked.

OBJECTIVE: Using a slide rule, be able to find the log of a three-digit number.

TEST ITEMS:

1. Describe in your own words how to find a logarithm on a slide rule.

2. Using a table of logarithms, find the log of:

   a. .00872
   b. 3.24
   c. 9716

✓ 3. Using your slide rule, find the log of the following numbers:

   a. 456
   b. 0.0752
   c. 34.5

4. Identify the mantissa in each of the following:

   a. 0.602
   b. 1.398
   c. 2.659

OBJECTIVE: Given a pair of earphones and a pure tone generator, be able to tell the difference between two consecutive tones which are 50 cycles apart.

TEST ITEMS:

✓ 1. Discriminate between two tones of 5000 and 5050 cycles.

2. Define the range of audible frequencies.

3. Explain in your own words the theory of an audition.

4. List the steps in measuring a just noticeable difference.

- - - - - - - - - - - - - - - -

OBJECTIVE: Given a wood lathe, appropriate tools, and rectangular walnut stock, be able to turn a table leg suitable for a coffee table. The leg should be tapered in any way desired by the student, provided the narrow end differs from the wide end by at least $^1/_2$ inch in diameter.

TEST ITEMS:

✓ 1. Construct a table leg from rectangular walnut that contains at least a $^1/_2$ inch taper, using the lathe and tools provided.

2. Describe the wood lathe and related tools.

3. List, in proper sequence, the steps required to construct a set of table legs.

4. Describe the advantages of legs.

- - - - - - - - - - - - - - - -

OBJECTIVE: From three lists of merchandise and their prices, be able to fill out three appropriate sales slips without error.

TEST ITEMS:

1. Describe in detail and in your own words the difference between the three types of sales slips.

2. Identify the three sales slips in terms of color and size, and determine the price range of merchandise recorded on each.

[✓ 3.] Fill out the three attached sales slips for each list of merchandise.

4. Supply the customer with a cash register receipt instead of completing the three forms.

- - - - - - - - - - - - - - - -

OBJECTIVE: Given a carburetor that is misadjusted but which contains no malfunctions, be able to readjust it for maximum performance within 5 minutes. Maximum performance is defined by the oscilloscope pattern specified by the instructor.

TEST ITEMS:

1. Identify the correct pattern as seen on the oscilloscope from several examples illustrated in the carburetor manual.

2. Describe and define the functions of a carburetor.

[✓ 3.] Reset the misadjusted carburetor so that the correct pattern will appear on the oscilloscope within five minutes.

4. List the difference between the two-barrel type verses the four barrel type of carburetor.

- - - - - - - - - - - - - - - -

OBJECTIVE: Be able to correctly assemble an M-16 rifle blindfolded, within ten minutes.

TEST ITEMS:

1. List the parts of the M-16 rifle.

2. Describe the action of the M-16 rifle and why it is superior to others. Also state the history of the rifle and pertinent facts concerning its use.

3. Memorize the location of each part on the table so that a faster assembling time can be achieved.

✓ 4. On the table in front of you is a disassembled M-16 rifle. Identify the parts with your fingers and assemble the rifle within ten minutes. Once assembled, check and inspect for accuracy.

CHAPTER IX

THE LESSON UNIT

The first step in course development is to outline the lesson units. A lesson unit answers the question, "what do I have to do, and what does the student have to do, in order for him to achieve objective X or to perform a given task?" Some lesson units will require only a few minutes of course time, while others will require several hours. In some cases two or more lesson units can be completed during an hour of course time; in other cases two or three hours might be required to complete a single unit. For example, the objective calling for the student to be able to replace tubes in a television receiver can be achieved in a lesson unit requiring no more than an hour, but to replace an automobile engine entails a lesson unit requiring several hours. On the following page is a form you might find useful in laying out lesson units. At the top of each sheet you would write the objective of the unit. In the left-hand column you would outline the instruction you feel needed to reach the objective. The way in which the instructional procedures will be selected, whether it will be a lecture or film or slide series, etc., will be described shortly.

In the second column write down what the student will be doing during each phase of the instruction. For example, if an instructional step will be accomplished by lecturing, the student will be listening. If the instructional procedure is to be a film, the student will be listening and watching. If it is to be a demonstration, the student will be watching and asking questions. If an instructional step involves having the student repeat a demonstration, then the student will be performing.

Each lesson unit should include instruction that allows the student to practice doing that which is the object of the unit. If there isn't any student doing in the student activity column, revision is clearly called for.

In the third column fill in your best estimate of the amount of time involved in accomplishing each instructional step. These estimates will help you to organize the units into lessons that will fit the time blocks used at your institution (assuming you are not yet in a position to abolish the outmoded notion of fixed time blocks).

LESSON UNIT OBJECTIVE: Be able to clean and replace spark plugs in foreign cars.

INSTRUCTIONAL METHOD OR PROCEDURE	STUDENT ACTIVITY	ESTIMATED TIME
1. Demonstrate the procedure in changing a spark plug. a. Removal b. Plug location c. Ignition connections	Watching and asking questions	20 minutes
2. Review task objectives	Discussion	10 minutes
3. Show a film on spark plug cleaning	Watching and listening	30 minutes
4. Discuss film and compare techniques	Discussion	20 minutes
5. Break		10 minutes
6. Practice removing plugs on engine block mockups	Individual practice	30 minutes
7. Practice removing plug in at least four student cars.	Individual practice	2 hours
8. Performance test on removing, cleaning and replacing spark plugs.	Question answering	1 hour
9. Show slides of spark plug types for discrimination training.	Discrimination practice	30 minutes

CHAPTER X

SELECTION OF INSTRUCTIONAL PROCEDURES

The preceding steps have been directed toward answering the question, "How to decide what to teach?" The next question has to do with the selection of instructional procedures and materials that are related to each of the objectives. There are many techniques for presenting information and for transmitting skills, just as there are many tools in the toolbox. Since not all instructional tools are equally effective in reaching each instructional goal, it will be useful to discuss the bases on which intelligent choices can be made.

A word of caution, however, is in order. Though schools and instructors have been in existence for centuries, and though educational researchers have been at work for decades, we do not yet have a science-based guide that tells us how to make accurate selection of appropriate instructional strategy. Psychological research has provided some insight into this problem, and in this chapter we will try to translate that information into usable guides in the selection of instructional procedures and materials.

Characteristics of Instructional Procedures and Materials

The instructional procedures toolbox is a full one, ranging from apprenticeship training, simulators, self-instructional demonstrations, and field trips, through motion pictures, television, filmstrips, transparencies, disk and tape recordings, to the graphic media (charts, graphs, diagrams, maps, cartoons) that represent reality, and the symbolic media (the written and spoken word).

Each instructional medium has specific characteristics, or features. For example, lecturing is easy to do and is therefore convenient for the instructor, but it forces the student to be relatively passive.

One feature of the magnetic tape recording or disk recording is the organized simulation of a series of sounds. If listening discrimination is essential to the learning objective, the audio playback device is likely to have features most relevant to achievement of efficient learning.

Projection devices also have distinct features. Slides, overhead transparencies, filmstrips, motion pictures, and television have the common characteristic of presenting a photographic reproduction of reality... a mirror image of life, so to speak. Magnification is another common feature, as is color. Editing possibility is a feature of the slide and the transparency making possible timely changes and updating of content. The filmstrip, in contrast, features a fixed order of presentation. Adding a tape or disk recording to these still picture devices adds a sound message capability.

With time lapse, slow and fast motion photography, the motion picture can expand and compress the real time scale; animation, X-ray, and micro-photography can reveal processes and concepts invisible to the eye; a documentary record of an important event may be easily reproduced; and history may be recreated or on-site visits made anywhere in the world via the film.

One feature common to several instructional techniques is direct student participation. Supervised on-the-job training, for example, has long been used by vocational-technical educators as an instructional technique where manipulation skill development is the primary goal. Simulators also allow skill development as do some mock-ups and working models.

Much has been written about the characteristics or features of the many instructional techniques and devices currently available. For more complete information and guidance on the characteristics and capabilities of these materials, refer to Chapter XV.

Advantages of Instructional Procedures and Materials

There is a large difference, however, between a feature or characteristic, and an advantage. A feature only becomes an advantage if the feature is appropriate or relevant to reaching some goal. For example, one of the features of a pair of roller skates is that they are relatively inexpensive. But is this feature an advantage? An advantage for what? If our goal is to get to South America by the fastest available means, the fact that roller skates are inexpensive is no advantage at all.

We have in our toolboxes a small screwdriver with a blade small enough to fit tiny screws. Is this feature an advantage? It depends entirely on what we are trying to accomplish... it depends on our objective. If our immediate goal is to turn a large screw, then the small blade feature is clearly not an advantage. Here is another example. One feature of a small car is that it can be parked more easily than a large stationwagon. Is this an advantage? It is if your goal is to do a lot of city driving. But if your goal is to carry as many bushels of apples as possible in one trip to the market, then the characteristic of "smallness" is not an advantage.

Selecting Appropriate Procedures

Hopefully the point has been made that the selection of an appropriate teaching procedure begins with determining precisely what the performance objectives are. This is step one, and is a step you have already completed if you followed the suggestions included in Chapter IV. With the type of performance identified for each part of each task it is possible to go on to the next step.

Step two is to identify the general class of procedure or combination of procedures appropriate for reaching each objective. For example, if one objective is, "given two pairs of engine sounds, the student must be able to identify the one most representative of a smooth-running engine," then some form of audio instruction is appropriate. If one step in learning to perform a task is learning to recognize when a table has been properly set, then some form of visual technique is appropriate. In this case a drawing, or slide, or photograph, or film might be used. A tape recorder or a lecture would be less appropriate in reaching this goal. If one of the objectives calls for the student to be able to actually set a table, then a different technique is called for. First, he should be taught to discriminate between a properly set and improperly set table, but then he should be given actual practice. For this objective an actual table and utensils are more appropriate than a discussion or a filmstrip.

Here are three guides to use in the accomplishment of the second step in instructional procedures selection, identification of those procedures related to each performance goal.

a. Choose the technique that most closely approximates the performance conditions called for by the objective.

If the objective calls for the student to do something in response to what he sees, select a technique that most closely approximates the seeing to which he will respond. If the machinist needs to be able to tell the difference between metals by looking at them, provide the student with something to look at. Actual samples would be better than pictures, colored pictures would be better than black and white, any kind of picture or visual representation would be better than instruction by radio. If the student will be expected to tell the difference between materials by feeling them, just telling him how to tell the difference isn't as good as guided practice, where guided practice is defined as "actual doing by the student accompanied by verbal instruction by the instructor."

b. Choose the technique that causes the student to perform in a manner most closely approximating the performance called for on the job.

If, in response to a visual cue or stimulus the student will be expected to say something, select the technique that will give him practice saying. If, in response to an auditory situation, the student will be expected to repair something, then select a technique that will give him practice in repairing. If an objective calls for a student to be able to describe relationships between parts of a system, select the technique that will cause him to do this. In this instance some form of recitation technique would be better than the showing of a film.

c. Choose the technique that will allow the student to make the largest number of relevant responses per unit time.

Suppose the welder has to learn to recognize when his torch flame is properly adjusted to perform a particular task. If a photograph or slide or film can show all the cues by which the student will be expected to discriminate proper from improper flames, then these techniques would be better than the actual flame itself. Why? Because with a notebook of photographs or a tray of slides we can give the student much more discrimination practice in fifteen minutes than we could if we had to actually adjust a flame to show each of the good and bad features we want him to practice with. But while the slides or photographs are appropriate for reaching the discrimination objective, they are not appropriate for reaching the performance objective. There it is better to give him actual flame-adjusting practice. Since practice isn't much good until the student can tell when he is doing it right and when he is doing it wrong, discrimination training would come first, and actual practice second. The discrimination part would be taught faster with slides or pictures, but the practice should be accomplished on the best available approximation of the actual device, and as soon as possible following the discrimination phase.

Here is another example. The objective is to teach prospective woodshop instructors and on-the-job supervisors to discriminate by sound cues the various problems that arise when beginners operate the single surface planer. When properly fed, this machine gives off a "normal" hum, and any variation from this sound indicates trouble or inefficient utilization. Too heavy a bite in cutting the wood lowers the sound pitch; too light a bite produces a vibrating sound. If the wood is fed so the grain is in the wrong direction, a chipping sound is heard; and if imperfect wood containing knots, chips, splits, or nails is inserted, other audible clues can be detected. The objective would be better reached by a demonstration incorporating a programed tape recording of the sound discriminations to be mastered, than by merely a lecture about sounds or a filmstrip showing the improper way wood can be fed into the planer.

Step three is to select among the procedures (identified as appropriate for reaching each objective) on the basis of administrative criteria. The most appropriate technique isn't always an available technique; the most appropriate technique isn't always practical, or within the budget. For example, the best way to teach an astronaut how to work under weightless conditions is to give him practice under zero gravity. Since this would be impractical and very costly, a substitute must be found, and a variety of simulators have been constructed for this purpose.

If it is determined that slides, filmstrips or photographs would work equally well, select the one that is most available and most likely to be used. If slide or filmstrip projectors are available but normally located somewhere other than the classroom, photographs would be preferred.

Let's try the above guides on one or two examples. Suppose an objective calls for the student to be able to respond, in French, to spoken questions in French. Applying guide a. we see that among the appropriate techniques are those that can speak French to the student; in other words, audio techniques. This might be done by the instructor, or by a record, by audio tape, by television, or by film. Applying guide b. we find that the student could make an appropriate response to any of these techniques, and so none are eliminated on this basis. In applying guide c., however, we are likely to rule out at least the instructor for logistic reasons. It is likely that each student will get less practice if the instructor is forced to provide the verbal stimulus, than if each student were provided with his own tape recorder or language laboratory station. A film is likely to be eliminated for similar reasons. Finally, in comparing what is appropriate with what is available and practical, we might have to eliminate the language laboratory ... if one does not exist in the training situation and if the budget is not likely to provide one in the foreseeable future. If tape playback equipment is equally unavailable, then the instructor himself may be the best practical alternative. The strategy is to pick those techniques most relevant to the type of learning involved, and then make final selections on the basis of availability and probable use.

Here's another example. One of the skills involved in driving a car is the ability to sense potential dangers. Such dangers are detected by the eye and by the ear. Applying guide a. we find that appropriate techniques for presenting relevant cues or stimuli would be through actual driving, through sound films, or through slides or pictures accompanied by audio tape. Applying guide b. we find that the appropriate response can be made to any of these techniques, since in this case it is an identification response that is wanted. (This would not be the case for the objective requiring the student to learn what to do in response to danger detection.) Applying guide c. we would rule out the actual driving situation, because far more discrimination practice can be systematically given through films or slides than through actual driving. We would rule out the actual driving situation when we apply our administrative criteria, too, because it would be considerably less economical and less practical than the use of the specially designed films already available. So in this case a film would be most appropriate, video tape might be next most appropriate, then slides, and then actual road conditions.

To summarize, selection of instructional procedures involves:

1. Identifying the type of performance desired,

2. Identifying those procedures most relevant to the desired performance, and

3. Selecting those that are most practical from among those that are appropriate.

To help you identify procedures and materials that might be useful in teaching your own vocation or profession, some available types and sources are listed in Chapter XV. You might also find it useful to write to your own professional society for a list of instructional materials relating to your field. Most societies have already prepared such a summary.

CHAPTER XI

LESSON PLAN DEVELOPMENT

Little remains to be said about lesson plan development, since most of the steps have already been completed. What remains is to select the procedure most appropriate for each item of your lesson unit outline, describe the student activity associated with each of the instructional techniques, and then estimate the time required. At this point it is necessary to make some concessions to the rules and procedures of your institution ... to force a few round pegs into square holes, so to speak. If the institution has fixed rules about the length of class periods, and about what students must do during class hours; that is, if the institution is designed more for the convenience of administrators than students, it will be necessary to adjust your lessons to these restrictions. But there will be restrictions even in the most enlightened and flexable institutions, and here is the place to compromise between the ideal and the possible.

Following are two examples of what a page of a lesson plan might look like. There are probably as many schemes for writing lesson plans as there are teachers, and there is nothing special about our examples. . . with one exception. Since the form makes clear what the student will be doing during each phase of the instruction, the form makes it easy to spot lessons where student activities are inappropriate to the objectives. The lesson plan that calls only for looking and listening is one that should be carefully reviewed, to see how some relevant doing can be added.

During the development of a course an instructor comes across many problems and questions that are difficult to answer. He is faced with many decisions about what to include and what to exclude, about extent of coverage and emphasis, about what the student can already do and about what interests him. We would strongly urge you to consider the student as your ally, because in most cases he will be able to provide you with the answer to your questions. If you want to know whether an explanation is clear or meaningful, ask a student. If you want to know whether a particular technique succeeds in teaching, try it out on a student. After all, your job is to facilitate student behavior, and the very best way to find out how well you are doing is to ask the student.

LESSON PLAN

COURSE: NURSING

Lesson No. 1

PROCEDURE	STUDENT ACTIVITY	TIME
Introduction by Instructor	Listening	10 Minutes
Hand out Objectives - Discuss Objectives	Discussion	40 Minutes
Break		10 Minutes
Show Film: "The Modern Nurse"	Watching and Listening	30 Minutes
Discuss Film	Discussion	20 Minutes
Give Pre-Test	Answering Questions	20 Minutes
Break		10 Minutes
Organize Curriculum for Each Student Based on Pre-Test Results	Discussion and Planning	2 Hours

LESSON PLAN

COURSE: NURSING

Lesson No. 12

PROCEDURE	STUDENT ACTIVITY	TIME
Practice Problem on Scale Reading	Reading thermometer scales	30 Minutes
Demonstration of Complete Task a. Sterilization b. Preparation c. Placement in mouth	Watching and Asking Questions	20 Minutes
Break		10 Minutes
Pair Students off for Guided Practice	Practicing the task	30 Minutes
Break		10 Minutes
Individual Performance Test	Each Student takes instructor's temperature	5 Minutes per student

CHAPTER XII

SEQUENCING THE INSTRUCTIONAL UNITS

Special consideration must be given to the sequence in which the instructional units will be presented, because it is known that what is meaningful for the instructor is not necessarily meaningful for the student. Units should be sequenced in an order that is most meaningful to the student. For example, if you suddenly had to learn how to repair a missile system, would you first want to be taught electronic theory, or would you first want to know what the system does and how to operate it? Do you think you could learn to understand the details of automobile repair if you didn't know what a car was? If you had to withdraw from a course for some reason wouldn't you rather leave with a usable skill than merely with the theory and background leading to a skill?

Here are six guides to effective sequencing of instructional material.

1. From general to specific. Students mean something different from instructors when they agree they would like instruction to proceed from the "simple to the complex." While instructors tend to be comfortable with sequencing from the elements of a subject toward the big picture, students generally find it more meaningful to move from the big picture toward the details. Once the student knows the subject matter then he, too, can find a specific-to-general sequence meaningful.

To apply this rule you would begin by teaching the student how to operate a machine before you would teach him how to repair it or before you would teach him any theory. Teach him how something works first, and why it works that way later.

2. Interest sequencing. To maintain the motivation of the student start with a unit that contains information he is highly interested in at the beginning of the course. Example: Since most students entering a locksmithing course seem to be highly interested in learning how to pick a lock, the first lesson might teach them how to pick one kind of lock.

Identify those units that are most interesting to students, and then seed these units among the others wherever possible.

3. Logical sequencing. Sometimes the subject matter dictates that one unit be taught before another. Example: A skindiver must be taught how to operate his breathing equipment before he can be taught to perform underwater maneuvers.

Where it is necessary to teach one thing before another, do so. But be careful! There isn't nearly as much reason for this kind of sequencing as we like to believe. A man doesn't have to know anything about mathematics before he can be taught to repair a television set, he doesn't have to know the theory of how an automobile engine works before he can learn how to adjust a carburetor, and he doesn't have to know how to lay a foundation before he can be taught to construct a roof.

4. Skill sequencing. If a man has to leave a course before finishing it (for whatever reason), it is better to send him away with the ability to do a complete, if lesser, job than to send him away able only to talk about a job. Example: First teach a man everything he needs to know to become a qualified plumber's helper, and then teach him what he needs in addition to become a qualified plumber. Example: Teach a man everything he needs to know about radio repair first, and then add what else he needs to become a television repairman.

5. Frequency sequencing. Which skills will a man use most frequently on the job? Teach him first those skills he will use most often; then sequence the rest of your units in order of decreasing usefulness or importance. In this way, while you may fail to teach him one or two things because you run out of time, the skills he will be without will be those he will need least often. Example: Teach a locksmithing student how to make keys before you teach him how to change combinations; teach an automobile repairman how to adjust a carburetor before you teach him how to weld an engine block; teach a television repairman how to change a tube before you teach him how to change a resistor.

6. Total job practice. Some courses we know about systematically give a student knowledge and practice in each element of a job, but allow the course to end without ever giving the student an opportunity to practice the entire job. The student needs a chance to practice the entire job as much as he needs practice in the bits and pieces of the job. At least 5% of the course time should be devoted to such practice, during which the student actually practices performing the total job under conditions as similar as possible to those he will face as soon as the course is over.

CHAPTER XIII

IMPROVING COURSE EFFICIENCY

No matter how scientific or systematic a procedure that may be available through which to develop a course of instruction, the number of compromises that must be made with circumstances and local conditions makes it inevitable that the original course can still be improved. The fact that we still have a lot to learn about instructional design makes it certain that continued effort will result in further course improvement. Although the procedure we have outlined in this thin volume is based both on learning research results and on practical tryouts in the classroom, there are many questions that are yet to be answered.

Fortunately the technique we have outlined contains within it procedures for checking the efficiency of a course, and for spotting places where improvements can be made.

One of these procedures tells us how well the course succeeds in teaching what we have decided to teach; the other tells us how well we decided what to teach. The first involves checking student performance against the objectives, and the second involves checking the objectives against the job. These two procedures must be kept separate to avoid making the mistake of changing an objective because it wasn't reached rather than because it is irrelevant or outdated. A man could fail to perform a job adequately because he picked the wrong tool, or because he picked the right tool but couldn't use it properly. The same is true of a course. A course could fail to produce students who are effectively prepared for a vocation because they were taught the wrong things, or because they were taught the right things ... but weren't taught them well enough.

Let us consider the first of these procedures ... checking the course efficiency. The procedure is simple in theory, and only a little more difficult in practice. It consists of answering the question, "how well did students achieve each of the objectives I specified?" How well did student performance compare with the performance called for in the objectives?

The proper comparison is made between final performance of the student and the terminal (end-of-course) objectives, and the comparison is made one objective at a time. To determine how well your objectives were reached you are not interested in how many objectives were reached on the average; rather the interest is in the percentage of students that reached each objective. For example, if I were to tell you that "eighty percent of my students reached my objectives," you wouldn't have any information on the basis of which to improve my course. You couldn't tell from that kind of statistic which objectives were reached and which were not. Such a figure could mean any number of things. It could mean that eight out of ten students reached each of the objectives, or it could mean that all students reached eighty percent of them and that none of the students achieved twenty percent of them.

What is wanted is a separate indicator for each objective. If, for example, an objective calls for students to be able to make a particular adjustment in five minutes or less, and if all students reach at least that level of skill, then the objective has been perfectly reached. You may discover later that the five-minute limit needs to be changed, but that is another matter. What is important at this point is determining how well you succeeded in doing what you set out to do.

If only 70% of the students reached the required performance level, then 30% of them failed to reach that level, regardless of how well they perform in other areas. In this case you would have to consider yourself only 70% successful in developing the level of performance you wanted. (There may be good reasons beyond your control why the remaining 30% can't perform, but the fact still remains that you failed to get them to the desired goal.)

What if these students could perform the adjustment in five minutes and one second? Sorry, but that's your problem. If you specified five minutes as the limit, then these students failed to perform to your standards. If five minutes and one second is as good as five minutes, then adjust the objective by all means. But not before checking to see how well you reached the goal as originally stated.

The information gained from this analysis will show you where course emphasis needs to be changed, where more effort would be warranted in course design. Further, it will allow you to make better decisions when faced with information about an inadequacy students may appear to have on the job, because you will be able to tell whether the inadequacy is the result of ineffective training or of improperly selected objectives.

CHAPTER XIV

IMPROVING COURSE EFFECTIVENESS

The course is efficient to the degree it does what it sets out to do. It is effective to the degree it sets out to do those things most related to the job or vocation to be taught. As we have seen, efficiency is checked by comparing actual student performance with the objectives. Effectiveness, on the other hand, is checked by comparing the objectives with the actual job or vocation. The effective vocational course is one that selects the appropriate objectives ... and causes each student to reach them.

There is good reason to keep checking on the appropriateness of objectives. Jobs change, and sometimes they change rapidly. Computer programming, for example, is a course that needs revision almost monthly if it is to keep up with the world. New tools become available, new techniques are introduced, new information must be mastered, and new environments appear. The vocational educator, probably more than anyone else, is painfully aware of the ways in which jobs change. And for just this reason he needs to make periodic checks on the relevance of his course objectives.

The procedures for accomplishing this are more time consuming than difficult ... but important. Here again the student is the principal source of information. Here are five suggestions about how to check on the appropriateness of course objectives, presented in order of how easy they are to do. Unfortunately, the easiest ones are the least informative, but we are more interested in providing you with practical information than with tasks you are too busy to carry out.

1. Between one and two months after a student has left your course and reported for a job, call him on the phone. By this time he will have run into most of the problems, if any, that will develop because of any weaknesses in his training. Ask him to tell you what sort of things he is doing, and how often he does them. Ask him what problems he has run into, and why. Ask him what he can do particularly well. In other words, do a task analysis over the telephone. But ask him about the job, not about the course. You already know how well he reached each of the course objectives. What you are looking for is information about how well the objectives match the job. If he volunteers information about the course accept it without comment, and then ask him more questions about what he actually does, and about how well he is expected to perform.

   How many students should you call (assuming that phone calls are within reason)? Keep calling until the answers begin to fall into a pattern, until the answers begin to become repetitious. Then stop, and decide how your course objectives should be modified on the basis of what you have learned.

2. If a few phone calls to students is impractical, send them a questionnaire asking about job conditions, the frequency with which they are asked to perform various tasks, about what they could do well when they began the job, and about where they are weak. In other words, ask the questions that will help you check on your course objectives. While it may make the student feel better if you ask him how the course might be improved, put less weight on his answer than on his answers to questions about the job itself. While you may be interested in what people say about course improvement, your course decisions should be based on more objective information ... such as is obtained by comparing what the job is with your objectives... and as is obtained by comparing your objectives with actual student performance.

3. Between one and two months after a student has reported for a job, visit him at his place of work. For some instructors this is the simplest thing to do ... for others it is impossible. If you can make such a visit, do the same thing suggested in the paragraph above. Ask about the job, not about the course. In addition, look around to see what machines and instruments are used, and how they are maintained. Check to see what tools are in use, and ask about new procedures.

4. Between one and two months after a man has reported for a job, talk to his supervisor. Talk with him on the phone, or visit him. Ask him how well your former student could perform the job when he first arrived and about how well he can perform it now. Ask him what he could do particularly well, and ask him about weaknesses.

But try to keep him talking about the job. Almost anyone who has ever been to school considers himself an expert in education, and almost everyone will be happy to tell you how you can improve your course. Listen politely, but not too intently. YOU are the expert instructor, and you will decide how the course can be improved. The supervisor doesn't know in detail what the course objectives are and he is therefore in no position to compare student performance with the objectives. He is in a position to tell you how well a man is performing his work, and that is the information you need to help you make decisions about alterations in objectives.

This point is too important not to repeat. You will not be able to prevent people from telling you how to teach, and about how things were when they went to school. So the strategy to adopt is that of listening politely without arguing (or you'll never get to the information you want). When it is your turn to talk ask another question about how well your man performs.

5. If possible, get a summer job working at your vocation. If your employment situation allows it this is an effective way of keeping up with your profession, even if you only manage a working summer every four or five years. If you happen to be a trainer in a corporation, however, this advice is about as useful as a rubber key, because your summer will already be accounted for.

There are other activities that will help you keep up with what is new in your specialty ... reading journals and trade papers, and talking with people you know who are working experts in your field. But these are things you do anyhow, and need not be elaborated on here.

If you act to make your course objectives correspond with the needs of the vocation, and if you act to cause each qualified student to reach these objectives, you can be sure of having a highly effective course ... and you will be able to demonstrate your success as a professional instructor.

CHAPTER XV

SOURCES OF INSTRUCTIONAL MATERIALS

This chapter consists of a brief guide to information about some specific types of procedures, materials, and devices, and a selected list of references describing relevant sources of information.

Guide to Information on Specific Procedures, Materials, and Devices

This guide is keyed by page number to the following four readily available texts:

1. Brown, James W., Lewis, Richard B., and Harcleroad, Fred F. *A-V Instruction: Materials and Methods.* Second Edition. New York: McGraw-Hill Book Company. 1964. 592 p.

2. DeKieffer, Robert E. *Audiovisual Instruction.* New York: The Center for Applied Research in Education. 1965. 117 p.

3. Erickson, Carlton W. H. *Fundamentals of Teaching with Audiovisual Technology.* New York: The Macmillan Company. 1965. 384 p.

4. Wittich, Walter A. and Schuller, Charles F. *Audiovisual Materials: Their Nature and Use.* Third Edition. New York: Harper and Brothers. 1962. 500 p.

Selection, Utilization, and Preparation of Instructional Materials	Brown, Lewis, & Harcleroad	DeKieffer	Erickson	Wittich & Schuller
Television	210-245, 361-362	64-65	77-80, 114-115, 215-224, 253-259	407-429
Radio	201-209	60-63	72-73	271-276
Sound Recordings	194-201, 208-209, 348-360, 362-368, 525-535	56-60	188-189, 197-206, 241-246, 286-288, 339-346	265-309
Graphics Production	369-386, 464-494, 503-504	9-27	282-316	108-148
Display Materials	267-295	11-27, 30-32	248, 283-286	149-171, 230-231
3-D Materials (Models, Mock-ups, Realia)	297-313, 413-436	14-17 23-25	44-47, 120-124, 233-235	208-237
Demonstrations	315-327	19-27	155, 217, 233-235	
Dramatizations	328-338, 347	29-30	6, 25, 45	301-302
Discussions & Lectures	338-347	64	125-126 215-224	
Community Resources (Field Trips, Museums)	387-412		231-233	249-264
Projected Still Pictures	142-162, 437-463, 476-477, 535-544	33-51	58-70, 325-339	311-352
Motion Pictures	163-187, 494-504, 535-538, 545-555	33-51, 81-83	144-182, 275-281, 346-359	353-406

Programed Instruction & Teaching Machines	247-264		80-86, 182-196, 259-264	467-493
Multi-Media Presentations	154, 465	51-54	182-196 264-266	430-462
Facilities & Classroom Design	505-521	67-75	109-120	284-285, 418, 478
Sources of Materials, Supplies, Instruments	571-584		363-370	477-494

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Instructional Techniques and Media

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Brown, J. W., Lewis, R. B., and Harcleroad, F. F. A-V Instruction: Materials and Methods. Second Edition. New York: McGraw-Hill Book Company 1964. 592 p.

DeKieffer, R. E. Audiovisual Instruction. New York: The Center for Applied Research in Education. 1965. 117 p.

Erickson, C. W. H. Fundamentals of Teaching with Audiovisual Technology. New York: The Macmillan Company. 1965. 384 p.

Faris, G., Moldstad, J., and Frye, H. Improving the Learning Environment. Washington, D. C.: U. S. Government Printing Office. 1964. 148 p. (Supt. of Documents Catalog No. FS5. 234:34031)

Federal Aid for Industrial Arts. Washington, D. C.: American Industrial Arts Association, National Education Association, 1201 16th St., N. W. 1966, 92 p. Information on instructional aids, equipment, supervision, institutes, research, student assistance, and proposal guidelines.

Kelley, Clarice. A Selective Bibliography on New Media and Vocational Education and Retraining. Staff Paper Number One. Washington, D. C.: Educational Media Council, 1346 Connecticut Avenue, N. W. 1966. 26 p.

Kemp, J. Planning and Producing Audiovisual Materials. San Francisco: Chandler Publishing Company. 1963. 169 p.

Rufsvold, Margaret I., and Guss, Carolyn. Guides to Newer Educational Media. Chicago: American Library Association. 1961. 74 p.

Swanson, E. A. (Ed.) New Media in Teaching the Business Subjects. Washington, D. C.: National Business Education Association, National Education Association, 1201 16th St., N. W. 1965. 206 p.

Wedberg, D. P., and Bloodworth, M. Sources of Information on Educational Media, Organizations, Programs. Washington, D. C.: Educational Media Council, 1346 Connecticut Avenue, N. W. 1967.

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AIAA Publications/Audio-Visual Aids. Washington, D. C.: American Industrial Arts Association, National Education Association, 1201 16th St., N. W. Revised periodically.

Audio Cardalog. Larchmont, N. Y.: Max U. Bildersee, P. O. Box 989 to date. Reviews disk recordings and audio tapes; issued monthly except July and August on 3 x 5 cards.

Aviation Education Bibliography. Fourth Edition. Washington, D. C.: National Aerospace Education Council, 1025 Connecticut Ave., N. W. 1964. A compilation of films, filmstrips, books, periodicals and other teaching aids related to aviation and flight in the atmosphere.

Educational Media Index. Produced by the Educational Media Council. New York: McGraw-Hill Book Company. 1964. 14 volumes. A comprehensive listing of all nonprint instructional materials.

Educators Guide to Free Films. Randolph, Wisconsin: Educators Progress Service. Revised annually.

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Audiovisual Instruction. Published monthly except July and August by the Department of Audiovisual Instruction, National Education Association, 1201 16th St., N.W., Washington, D. C. Subscription: $6.00 per year.

AV Communication Review. Published quarterly by the Department of Audio-visual Instruction, National Education Association, 1201 16th St., N.W., Washington, D.C. Subscription: $6.00 per year.

Educational Screen and Audiovisual Guide. Published monthly by Educational Screen, Inc., 434 South Wabash, Chicago, Illinois. Subscription: $4.00 per year.

NAEB Journal. Published bimonthly by the National Association of Educational Broadcasters, 119 Gregory Hall, Urbana, Illinois. Subscription: $6.00 per year.

NSPI Journal. Published monthly except June and August by the National Society for Programmed Instruction, Trinity University, 715 Stadium Drive, San Antonio, Texas. Subscription: $7.50 per year.

Training in Business and Industry. Published monthly by the Gellert-Wolfman Publishing Corp., 33 West 60th St., New York, N. Y. Subscription: $5.00 per year.

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✓ CHECKLIST OF LEARNING RESOURCES

- ☐ Aquarium & Terrarium
- ☐ Book
  - Bound
  - Looseleaf
- ☐ Booklet
  - Album
  - Clipping
  - Diary
  - Publicity
  - Scrapbook
- ☐ Bulletin Board
- ☐ Campaign
- ☐ Cartoon
- ☐ Catalogue
- ☐ Chalkboard
- ☐ Chart
- ☐ Club or Society
- ☐ Collection
- ☐ Competition
- ☐ Computer
- ☐ Costumed Figure
- ☐ Cut-Out
- ☐ Data Processing Equipment
- ☐ Demonstration
- ☐ Diagram
- ☐ Diorama
- ☐ Display Device
  - Animated Display
  - Display Board
    - Combination
    - Flannel
    - Magnetic
    - Peg
    - Plastic
    - Velcro
  - Easel
  - Showcase
  - Stand
- ☐ Dramatic Presentation
  - Costumed Play
  - Marionette
  - Mask
  - Miniature Stage
  - Pageant
  - Pantomime
  - Puppet
  - Radio Play
  - Role Playing
  - Shadow Play
  - Tableau
- ☐ Drill Device
  - Drill Card
  - Flash Card
- ☐ Duplicator
  - Blueprinting
  - Carbon Paper
  - Diazo
  - Gelatin
  - Glue Plate
  - Offset
  - Photographic
    - Contact
    - Optical
  - Rubber Stamp
  - Spirit
  - Stencil
  - Sensitized Matrix
  - True-to-Scale
  - Xerography
- ☐ Electrical-Mechanical Device
  - Electric Map
  - Electric Questioner
- ☐ Exhibit
- ☐ Experiment
- ☐ Exploded View
- ☐ Facsimile
- ☐ Feltboard
- ☐ Field Trip
  - Excursion
  - School Journey
- ☐ Filing System
- ☐ Filmstrip
  - Silent
  - Sound
- ☐ Game
- ☐ Globe
- ☐ Graph
- ☐ Information Storage & Retrieval System
- ☐ Kit
- ☐ Laboratory
- ☐ Lettering Device
  - Brush
  - Cut-Out
  - Embosograf
  - Felt Tip Pen
  - Guide
  - Hot Press
  - Mechanical System
  - Photographic System
  - Printed Alphabet
  - Rubber Stamp
  - Speedball Pen
  - Stencil
- ☐ Library
- ☐ Magazine
- ☐ Map
- ☐ Microfilm
- ☐ Mock-Up
- ☐ Model
- ☐ Motion Picture - 8 mm. & 16 mm.
  - Silent or Sound
    - Analytical
    - Animated
    - High Speed
    - Single Concept
    - Stop-Motion
    - Time Lapse
- ☐ Mould
- ☐ Museum
- ☐ Newspaper
- ☐ Notebook
- ☐ Object
- ☐ Optical Instrument
  - Binocular
  - Micro-Projector
  - Microscope
  - Telescope
- ☐ Pamphlet
- ☐ Photography
  - Still
  - Motion Picture
- ☐ Pictorial Card
- ☐ Picture
  - Drawing
  - Frieze
  - Mural
  - Painting
  - Photograph
  - Poster
  - Sketch
- ☐ Postage Stamp
- ☐ Presentation Device
  - Mechanical Writing Tablet
  - Presentation Unit
  - Status Board
- ☐ Printing Press
- ☐ Programmed Learning Device
- ☐ Projection Equipment
  - Projector
    - Cartridge Loading
    - Combination
    - Continuous
    - Filmstrip
- ☐ - Projector (continued)
    - Micro
    - Opaque
    - Overhead
    - Silent Film
    - Slide
    - Sound Film
    - Stereo
- ☐ - Screen
    - Front Projection
    - Multiple
    - Rear Projection
    - Wide
- ☐ Publication
  - Class Paper
  - School Paper
  - Yearbook
- ☐ Quotation
- ☐ Radio
- ☐ Realia
- ☐ Recording
  - Audio
    - Disc
    - Magnetic
      - Tape
      - Disc
  - Video
    - Kinescope
    - Kine Transfer
    - Magnetic
    - Thermoplastic
- ☐ Routine Device
  - Marking System
  - Response Indicator
  - Seating Plan
  - Visible Record System
- ☐ Sandtable
- ☐ Sign
- ☐ Silk Screen
- ☐ Slide
- ☐ Sound Equipment
  - Amplifier
  - Distribution System
    - Induction Loop
    - Oscillator
    - Wired
  - Headphones
  - Loudspeaker
  - Microphone
  - Radio
  - Record Player
  - School Sound System
  - Stereophonic Equipment
  - Tape Recorder
- ☐ Source Material
- ☐ Specimen
- ☐ Stereograph
  - Stereoscope
  - Telebinocular
- ☐ Storage Equipment
  - Modular Storage Units
- ☐ Study Carrel
- ☐ Tachistoscope
- ☐ Teacher
- ☐ Teacher Aide
- ☐ Team Teaching
- ☐ Telephone
- ☐ Television
  - Broadcast
  - Closed Circuit
- ☐ Test
- ☐ Textbook
- ☐ Toy
- ☐ Transparency
- ☐ Typewriter
- ☐ Workbook

CHANGES IN EDUCATIONAL EMPHASES

	FROM	TO
1.	The group	The individual
2.	Memory	Inquiry
3.	Spiritless Climate	Zest for learning
4.	The graded school	The nongraded school
5.	Self-contained classroom	Self-contained school
6.	Scheduled classes	Appointments and Independent learning
7.	Teacher as general practitioner	Teacher as clinical specialist (member of team)
8.	School building use geared to an agrarian society - nine-month year - limited to children	School building use reflecting urban society - twelve-month year - available to all age groups
9.	Classrooms that are like kitchens	Classrooms that are like libraries, living rooms
10.	Boxes and egg crates	Clusters and Zones of space
11.	Teaching as telling	Teaching as guiding
12.	A teaching schedule of 30 hours a week with children in class and 15 hours for planning and correcting	15 hours a week with children in class and 30 hours for research, planning, and development

From an address by Harold B. Gores,
printed in Schools for the Sixties,
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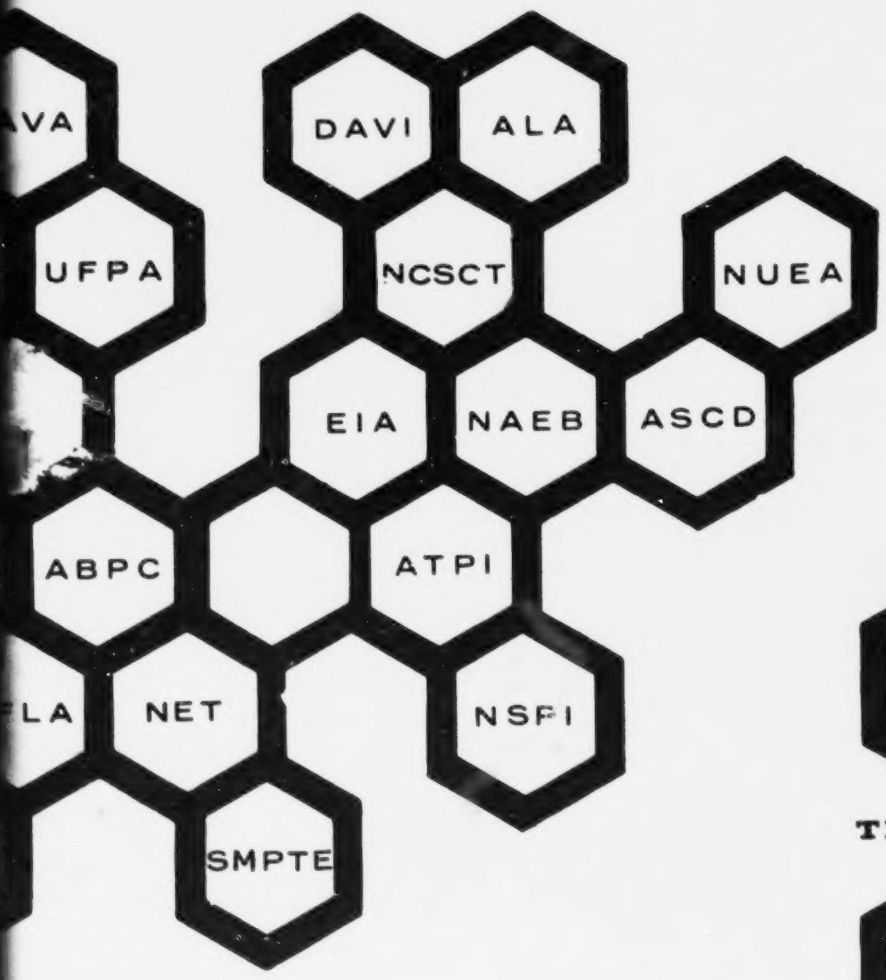
APPENDIX B


VA
DAVI
ALA
UFPA
NCSCT
NUEA
EIA
NAEB
ASCD
ABPC
ATPI
LA
NET
NSFI
SMPTE

The EMC Educational Media Council

FINAL REPORT

Project No. 5-0080
Contract No. OE 5-16-032

A STUDY OF THE CONCENTRATION OF EDUCATIONAL MEDIA RESOURCES TO ASSIST IN CERTAIN EDUCATION PROGRAMS OF NATIONAL CONCERN

PART II: EDUCATIONAL MEDIA AND VOCATIONAL EDUCATION

May, 1967

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE

Office of Education
Bureau of Research

THE FEASIBILITY OF USING NEWER EDUCATIONAL MEDIA PRODUCED BY AND FOR BUSINESS-INDUSTRY AND MILITARY-GOVERNMENTAL AGENCIES IN VOCATIONAL EDUCATION PROGRAMS

Raymond Wyman
University of Massachusetts

* * * *

The author is professor of education and director of the audiovisual center at the University of Massachusetts. He is also chairman of the University Master Planning Committee. He has recently completed terms on the board of directors and executive committee of the Department of Audiovisual Instruction. He is a member of the Society of Motion Picture and Television Engineers and the National Association of Educational Broadcasters. He has been representing DAVI in the National Association for Industry-Education Cooperation. He has been working closely with the National Audio Visual Association. He has recently completed a two-year study of the availability of locally produced overhead transparencies and recommendations for national distribution under USOE Title VIIB contracts. (Appendix 1) One part of these contracts involved the possible use of governmental and industrial transparencies in the regular school program. He has been an audiovisual supervisor for two public school systems that included vocational schools and is currently consulting on a vocational school addition at the American School for the Deaf in West Hartford, Connecticut. He was employed for ten years as a science teacher and for one summer as a machine room inspector at the American Bosch Corporation. He spent another summer as a General Electric Science Fellow.

* * * *

Education was once thought to be the exclusive domain of public and private schools. If one wanted a training program, he went to a school, usually public, set up for this expressed purpose. When he applied for business or industrial employment, he was presumed trained

trained in advance or that formal training was not necessary. As business and industry developed a great variety of needs for workers, as jobs became more complex, as the mobility of workers increased, and as the acquisition and development of new skills needed to be repeated several times through a worker's lifetime, there was no alternative to establishing in-plant training programs.

Although business and industrial training programs started with untrained teachers in crude or makeshift classrooms, they have rapidly evolved into sophisticated educational enterprises. Education is now a major activity of most of the larger corporations and many of the smaller ones. It is not uncommon today for an audiovisual salesman to remark that he would starve if he did not have industry to visit as well as the schools in his territory.. College courses in education frequently have industrial training supervisors in attendance.

The military services have always had special educational programs because there is no civilian equivalent for many of the things done by them. These training programs were once done outdoors with the actual equipment used. As equipment has multiplied and techniques have advanced, a tremendous classroom-laboratory educational program has developed. Going to school is a large part of current military life.

Other governmental agencies such as the Social Security Administration (Appendix 2), National Aeronautics and Space Administration and the National Institutes of Health have organized similar educational facilities and programs for training and retraining their employees.

The public relations activities of business, industry, and governmental agencies have also come to rely heavily on newer media and modern educational techniques to convey their messages.

Education, both in schools and business-industry and military-governmental agencies, has the general aim of changing individuals in desirable and specified ways. The changes may be in attitudes, understanding, interests, appreciation, concepts, knowledge or skills. Schools have tended to emphasize the first six and the out-of-school educators have tended to emphasize the last one.

All educators, in and out of school, have found that changing people is a most difficult job. It fails far more often than it succeeds, so that extensive, expensive and time-consuming programs result. Educators have been searching for devices, materials and techniques that could be employed to make learning more interesting, rapid, understood and permanent. A most important group of devices and techniques that can be employed to improve education at all ages, in most subject areas and in most places are described as newer media or audiovisual aids. Their use is expanding very rapidly at this time in education everywhere.

The expansion of newer media in nonschool areas has been well supported by management because of their demonstrated contributions. The American Management Association has conducted two large and well-publicized audiovisual institutes in New York City. These nonschool educational organizations have employed or trained media specialists, established media production shops and built or adapted classroom facilities. A new development is to install complex and individual training aids right at the station where the employee works.

Three groups; education, business-industry, and military-governmental agencies, have traditionally used just about the same projectors, recorders, etc. (the hardware) in order to expose or present the films, transparencies, tapes, etc. (the software). Military audiovisual equipment has been specially designed for hard service without so much regard for portability and price, but is otherwise similar. Industry has perhaps made more use of automatic and remote control equipment than have schools. However, almost any film, transparency or tape that can be used by one of these three groups can be used without difficulty by the other two, because the equipment and materials are compatible. The exceptions are mostly in the area of nonbook individualized instruction which is in a rapidly developing and nonstandardized form at this time.

The three groups; education, business-industry, and military-governmental agencies, have traditionally used three separate groups of instructional materials or software to go with their common machines or hardware. The feasibility of common use of at least some of the software is the purpose of this paper.

The software used in schools has been traditionally conceived, produced and distributed by specialized suppliers such as McGraw-Hill, Encyclopaedia Britannica Films, Coronet, etc. It has been supplemented by local production in schools that has usually been of limited sophistication, complexity and quality. Software produced for schools has been designed for general application in a wide variety of schools.

School audiovisual specialists generally belong to the Department of Audiovisual Instruction of the National Education Association.

The software used by business, industry, government agencies and the military has generally been produced by themselves or on contract with specialized production agencies. Extensive and complex media production facilities have been installed in many places. Only a few of the largest universities have anything to compare with them. Skilled personnel are of course available to handle all of the production aspects of the software.

The nonschool supervisors and producers of software have banded together into specialized interest groups in the American Society for Training and Development or the Industrial Audio Visual Association, both of which hold regular meetings. The National Audio Visual Association is more concerned with distribution of hardware and software than its production. The November 1966 issue of a monthly magazine "Training in Business and Industry" contains the following feature articles: (Appendix 3)

1. When Competitors Get Together
2. The Tortuous Path to Retraining
3. The Training Forecast: How to Make It - How to Use It
4. Directory of 16mm Motion Picture Projectors
5. Reorganization, New Aims, Speed Machinist Training
6. Organizational Aspects of Management Development

There is no doubt that there is much activity in the nonschool audiovisual area and the samples observed in visits and at conferences indicate that it is high in quality.

One might conclude that entirely different curricula accounts for the almost entirely separate libraries of media used by schools and the nonschool trainers, and that there is little benefit that might be gained from use of the vast amount of nonschool media if they were made available to schools. There are certainly large differences in the overall goals of schools, industry, government agencies, and the military. There are also some surprising similarities in some of the lessons, topics, or units taught by all three groups, particularly in the area of vocational education.

The goals of vocational education and the nonschool groups are near enough so that some of the materials could very profitably be used by both. Even if only a small percentage was available and useful, it would represent a substantial amount of material. United Airlines reported that it had over 11,000 overhead transparencies in its files for its training programs!

The needs of vocational education for newer media are great, probably much greater than for students in regular schools. Vocational students tend to be less print oriented. They choose material with more graphic and pictorial illustrations. Their interest in newer media tends to be high. They spend much time with television and movies. There is less need for simple and easily described skills, and a rapidly increasing need for complex and difficult skills. Newer media have proved very effective with these students in these subject areas.

Vocational schools seem to have made less use and less effective use of newer media than industry or government in the same subject areas. A limited survey of vocational schools by the author indicates that shopwork and traditional classroom work still dominate the typical vocational program. Media specialists, media production and effective media utilization seem to be generally lacking. Industrial motion pictures of the public relations type are often shown, but with little relation to the teaching program.

There are good reasons for the low use of newer media in vocational schools. The typical vocational instructor was trained in industry before the media revolution. He has had little contact with media in education. He hesitates to take current teacher training courses that might use newer media because he feels out of place with his academic colleagues. School media programs are commonly supervised by specialists who have little knowledge about or interest in vocational education. The conservatism of all teachers is undoubtedly shared by vocational teachers. The vocational school administrators have not provided the leadership necessary to obtain the facilities, equipment, materials and training necessary for wide and good use of newer media in vocational classrooms, shops and libraries. The requirements for newer media utilization are outlined in Appendix 4.

There seems no doubt that a dramatic improvement in vocational education could result in the near future if newer media were effectively employed. Industry and government agencies already have large quantities of high quality materials that were specifically designed to teach much of what is currently taught, or should be taught, in vocational schools.

Most of the existing material is not now so used. One of the author's visits was to the First Naval District Headquarters in Boston. Five very large looseleaf books of unclassified transparency masters were studied for several hours. Most of them would be of interest only in Navy training and they were ignored. There were also many hundreds of masters on mathematics, welding, metal working, electricity, electronics and safety that would be equally useful in vocational education. The man in charge was asked, "What use have the schools in the Boston area made of these excellent materials?" He queried an assistant, "Didn't one of the trade schools use some of our stuff three or four years ago?" Four samples of U. S. Navy transparencies appear as Appendix 5 A-D.

In addition to the Navy, the author has spent several hours with General Electric Company representatives in New York City, the U. S. Army at Fort Devens, the National Aeronautics and Space Administration and the Missile School at Huntsville, Alabama. Officials of the Social Security Administration's Headquarters visited the author with many samples of their excellent materials. There seemed to be considerable interest in helping schools by making already produced materials available. Correspondence with several other companies indicates similar materials and the general lack of use or even request for use by schools.

As part of the USOE transparency project, the National Association for Industry-Education Cooperation was approached for possible help. The author was asked to make a presentation to its section meeting at the National Science Teachers' Association meeting in New York City. An outline of the presentation appears as Appendix 6. There seemed to be considerable interest among representatives of many of the country's largest businesses and industries in making more materials available to education. A representative of the Automobile Manufacturer's Association responded to the invitation by bringing his graphics representative to the University of Massachusetts to talk over the making of transparencies that would be of most use to schools.

Although most of the USOE study was confined to transparencies for overhead projection and general school use, it seems logical to suppose that the other media would be available with the same high quality and with direct application to vocational education. However, there are many problems that must be solved if the already-produced newer media in business-industry and military-governmental agencies are to be used effectively in vocational education.

High level discussions and decisions must be made in order to free much of the material for use outside of the organization for which it was made. This is particularly true with the armed services. The Colonel in charge of the Missile School at Huntsville could not say whether a school could have copies of his masters, but he was enthusiastic about pressing his superiors for a favorable decision. The question of school use of industrial training materials seems not to have been asked enough so that an answer is ready. Governmental agencies such as Social Security and the National Security Seminar felt that they could provide their materials on request for any school use. The Captioned Films for the Deaf Office at USOE has contracted for quantities of visual material that is apparently in the public domain.

Knowledgeable educators must study the available material from all of the sources and determine the best materials for specified educational needs. There is often extensive duplication since there has been little communication among the nonschool producers of the materials for doing essentially similar jobs. This is a task for educators who are competent in both vocational and media areas, and considerable time will be required, particularly with industry. Government and military agencies seem to have centralized media libraries where the study could easily be made. General Electric said that such a study could be made only by personal visits to many departments of many scattered plants.

Suitable copies must somehow be made from the masters that are available. This is relatively easy with overhead transparencies since reproducible intermediate masters can be made from masters and all vocational schools have suitable print duplicators. Prints on tracing paper could be made from the masters in a vocational print shop for wide and inexpensive distribution. Conversion to transparencies could then be done as the need arises in the local school. Copies of motion pictures and other aids would be more difficult and expensive, but otherwise feasible.

The exciting applications of programmed learning materials to the individual learning of workers on the production or assembly line would probably have little application in vocational schools at this time. The equipment necessary for using the material is complex and expensive and it serves only one student at a time. Multimedia presentations are common, involving combinations of audio and visual materials. Another problem arises from the very specific job that is being programed. The vocational school of the future will probably have many carrels equipped with optical and electronic equipment for individual learning of complex tasks.

Printed programed materials for basic training programs in industry and government should be available and easily reproduced and used in vocational schools.

Suitable credit must be provided for the originator of the material used. Practically all of the industries and agencies that have the valuable materials are large enough to have extensive public relations operations that produce materials specifically for school use. These materials are of course identified so that good public relations as well as education will result from their use. One of the difficulties in giving credit to the producer will lie in the short or fragmentary nature of the materials used. Most sponsored materials are complete and often rather lengthy packages into which a PR message can be easily integrated. Many of the best users of newer media want to incorporate brief excerpts of many different materials into a presentation. It will be easy to put a brief credit line on an overhead transparency, but some ingenuity may be required to identify suitably a thirty-second motion picture or recording.

Catalogs of available materials would have to be produced so that the teachers could have a handy method of finding what was available and a suitable indication of content. Complete content of transparencies can be indicated best by putting miniature reproductions in the catalog. This is not so easy for motion pictures and recordings. However, unlike long sponsored materials, short film clips and recordings would most likely be previewed before use and soon known to the teachers. Short clips could most easily be used in cartridges.

It seems likely that all of the original materials provided by the industries and agencies would be provided free of charge as a continuation and expansion of their public relations activity. In some cases multiple copies for school use would also be provided free. In more cases it seems probable that reproduction would need to be handled and paid for by the schools or some organization set up to help the schools. The first alternative would be most common with industry and the latter most common with the military and government agencies.

During the transparency study, a group of subject matter and grade level specialists studied many examples of locally produced transparencies and came to three conclusions that would probably apply to materials from these sources also.

Some form of utilization notes should accompany most media distributed. The originator often assumes that every competent teacher should understand all of the material included, and know how to use it effectively. The specialists felt that this was not true in many cases. Either the originator or some specialist in the field would need to provide suitable notes to be included with the material and each copy made.

Some corrections or changes would need to be made when materials for a specific and limited use were made available for wide and continuing use. A number of mistakes in spelling, punctuation, capitalization, etc. annoyed the experts, but in addition, errors of labeling, diagraming, and fact concerned them greatly. Obsolete information can easily be perpetuated in a beautiful and expensive transparency! The date of manufacture or preparation is seldom found on commercial educational software. It would seem important to include it on everything accepted and used. Changes, of course, must be checked with the originator.

Many audiovisual materials obtained from others will be used for ideas rather than direct use. The best teachers often feel that they can improve on the material that others have made, and set about to do it. The idea exchanges might in the long run turn out to be a most worthwhile outcome.

An objection to this whole idea of educational use of materials from these sources may be raised by some of the commercial manufacturers of materials. Some of them feel that any materials to be used by a group of schools should be provided by the private sector of the economy. They feel that materials produced for other purposes and used in education would be unfair competition. Other commercial producers seem to feel that anything that will tend to increase media use regularly in classrooms will benefit them in the long run. Of course, the makers of equipment and consumable supplies will applaud the idea.

Technical standards for materials should be considered and an attempt made to obtain complete compatibility. Every movie should be usable in every school so standard 8 versus super 8 and cartridge versus reels need to be studied. Most audio tapes will play on most recorders and most transparencies are either two by two or ten by twelve inches and will project on most common machines. Television tape used in education is a nightmare of incompatibility. Standards for legibility should also be considered.

If vocational schools are to make good use of this potentially abundant and valuable storehouse of material, then certain things must happen in the individual schools.

The school administration must be convinced that communication hardware and software is important in the school programs. It would seem wise to provide brief institutes at which experts may demonstrate what can be done with them and how effective they have been. The short institute at Syracuse University for NDEA History Institute Directors last spring might be a model for this purpose.

A person in each school must have responsibility for the media program and the hardware and software needed. A part-time person would suffice in a small school and a full-time person in a school with perhaps twenty instructors. This person would maintain local libraries of materials, check materials in and out of the school and media center, and would see that machines were where they were needed and in good condition. He might train and schedule student operators. He would be the local expert needed to support the media program. He would work closely with the professional media person responsible for the entire school system. The individual school media person should probably have a two year course of technical training that includes electronics and photography.

Each teacher needs to have a place where he can assemble his group of students and teach with newer media in addition to his traditional methods. In vocational schools these spaces might be small. Equipment should be either permanent or provided on short notice when needed. Probably an overhead projector and screen should be permanent in each presentation space. Individual light control would be needed for any but overhead projection, and advantageous even for that. Sound isolation and control would be helpful too.

A local graphics production area should be available so that ideas not already visualized could be visualized on short notice. Large schools might employ a specialist for this, but most vocational teachers have some graphics ability, and some of them have an unusual amount. Although graphics is part of the curriculum, there would seem to be a real advantage in providing a separate teacher workshop. The school's big reproduction machines might be used also. A diagram of a small school audiovisual center designed by members of the Massachusetts Audiovisual Association appears as Appendix 7.

Teacher training is always necessary where a new or expanded program is started. The media summer institutes have been so successful the past few years that it would seem wise to do the training necessary for vocational teachers in the same way. The USOE Captioned Films for the Deaf program conducted three special media institutes for teachers of the deaf during the summer of 1966, and one of them was held at the University of Massachusetts. In-service courses or workshops could also be conducted during the regular school year by the school system media supervisor or a nearby college specialist. The institute during the summer seems to be more desirable.

A budget for equipment and materials will obviously be necessary. Newer media hardware and software cost money, but so do schools and teachers, and adding the media can make the schools and teachers much more effective percentage-wise than the added cost involved.

It would be a tremendous undertaking to find and make available all of the useful materials that now exist in business-industry and military-governmental agencies, and to have them available in all vocational schools which in turn must be provided with proper equipment and personnel trained in media utilization. A smaller beginning would seem to be necessary.

A pilot or demonstration project is suggested in which limited materials are selected from limited sources and used in certain schools provided with basic equipment, facilities and a special training program.

On the basis of the work already done for the USOE transparency project, it is suggested that the demonstration or pilot project include only overhead projection transparencies selected from about five business-industry sources such as General Electric, the armed services and larger government agencies such as the Social Security Administration and NASA. The vocational schools in one geographic area should be selected so that about twenty-five teachers in one curricular area, such as welding or electronics, are included. Their classrooms should be equipped for optimum overhead projection. They should be involved in a six-week summer institute on the selection, production, and utilization of overhead projection materials. They should be provided with outstanding instruction, consultants, field trips, and an opportunity to prepare and use materials (Appendix 8).

Overhead projection has been singled out for the limited project because so many excellent materials are known to exist, the masters can be easily duplicated, changes can be easily made by the individual teacher, additional and complementary transparencies can be locally made, credit to the originator is easily given, classrooms and other instructional areas are easily adapted to overhead instruction, and the collection, evaluation, duplication, and distribution of overhead materials could be easily managed during a summer institute.

The conclusions of this paper are summarized as follows:

1. Business-industry and military-governmental agencies are all engaged in massive educational programs at this time.

2. The educational program of these groups has become sophisticated and it relies heavily on newer media.

3. The public relations part of these groups has provided schools with audiovisual materials, but these are not the concern of this study.

4. Education means changing people, and this is a very difficult task that can be improved through the use of specialized and integrated media.

5. Schools and the nonschool groups have been using essentially the same audiovisual machines or hardware.

6. Schools and the nonschool groups have traditionally used almost entirely separate instructional materials or software such as films, transparencies and recordings.

7. The software used by schools has been produced largely by specialized corporations whereas the nonschool software has been produced in-plant or on contract.

8. A large amount of high quality newer media software is available outside of regular school channels.

9. An important part of the software which was not produced for school use would be very valuable to vocational schools.

10. Vocational schools need to make good use of media.

11. The nonschool groups have used media more than the vocational schools in teaching the same subject or topics.

12. There are good reasons why vocational schools have not made wide and good use of media.

13. A dramatic improvement in vocational education could result from use of existing materials produced by business-industry and military-governmental agencies.

14. The public relations group of these nonschool agencies has indicated that cooperation in such joint use of materials would be forthcoming. Probably no charge would be made for the use of these materials.

15. High level decisions would be necessary to free much of the material for school use.

16. There will be more difficulty in locating the business-industry materials due to decentralized production centers and media libraries.

17. Competent educators must evaluate and select materials to be duplicated and distributed.

18. Suitable credit must be given to the originator on each copy.

19. Catalogs with illustrations and descriptions of the available materials must be prepared.

20. Utilization notes should be prepared and distributed with the materials.

21. Corrections, adaptations or other changes may need to be made for school use, with the permission of the originators.

22. Ideas gained from the materials may be of as much help to vocational education as the materials themselves.

23. Local school production of instructional materials would be stimulated.

24. Some commercial media producers may object to this proposed project, whereas others would applaud it.

25. Technical standards are needed to assure compatibility of materials.

26. Vocational schools will need equipment, facilities, budgets and trained personnel in order to make effective use of newer media.

27. A project to provide all available materials and provide for their effective use in all vocational schools is probably too ambitious to attempt at this time.

28. A pilot or demonstration project seems completely feasible and most desirable.

29. The proposed demonstration project would include only overhead transparencies provided by selected sources and used by twenty-five teachers who attended a special institute and who had been provided with the equipment and materials necessary for optimum use of transparencies in their classrooms.

APPENDIX

1. Summary of Transparency Project
2. Social Security Administration materials
3. Page 4 of November 1966 issue of "Training in Business and Industry"
4. Outline of Media Utilization
5. A - D -- Four U. S. Navy transparencies
6. Outline of Business-Industry NSTA presentation
7. Outline of Small School Audiovisual Center
8. The Overhead Revolution

THE COMMONWEALTH OF MASSACHUSETTS

UNIVERSITY OF MASSACHUSETTS

Audiovisual Center
413 - 545-2454

AMHERST

01003

July 20, 1966

Dear Sir:

Your inquiry about the status of the national transparency study recently completed here is one of such a number that we must resort to a form reply.

In 1964 the University of Massachusetts entered into a contract with the U. S. office of Education, Title VIIB, to make a survey of locally produced overhead projection transparencies leading to recommendations for duplication and exchange. In 1965 a second phase of the project was funded as "The Availability and Characteristics of Locally Produced Overhead Transparencies." In March 1966, we prepared and submitted a report on our work to the U. S. Office of Education. Our findings are summarized as follows:

1. There are a vast number (91,799) of locally produced overhead projection masters in the schools and colleges of the United States that might be available and suitable for use in other schools and classrooms. Nineteen percent are at the elementary level, 53 percent secondary, and 28 percent at the college level.

2. At the elementary level, the four subject areas most supplied with locally produced transparencies are science, language arts, social studies and arithmetic.

3. At the secondary level, the largest numbers are in biology, history, geometry and English.

4. At the college level, the largest numbers are in education, physical science, languages and social science.

5. Thermal and diazo copying are the transparency-producing processes most used by the local makers of transparency masters. It is feasible to distribute translucent copies with black ink so that either of these two processes could be easily used. Photo copying and electrostatic equipment would also reproduce such masters so that all varieties of equipment reported could be used in reproducing transparencies.

6. Fifty-eight percent of the masters produced are about eight inches high and ten inches wide and are usually referred to as horizontal format. These can be projected with any overhead projector and on any screen. Thirty-six percent of the locally produced transparencies are the same size, but with the larger dimension vertical. They require a square projector aperture and square screen. Only four percent use the ten by ten size and format.

7. About three quarters (74%) of the local producers of transparencies are willing to permit the temporary loan of their masters to a nonprofit national center for evaluation and possible duplication and distribution. This would total about 68,000 available masters. About 17 % would not permit use of their masters or would require royalty. Rather than a problem of finding enough masters to initiate a national center, the problem instead will be one of selection from among a tremendous number of possibilities.

8. Editing of masters before duplication would be permitted by 75% of the producers and not permitted by only three percent. After viewing a sample of transparencies reported in the questionnaire, the conference participants indicated that some editorial work would probably be necessary on many masters and that it should be done in a manner similar to that in publication. Any basic change in content would be cleared with or done by the originator.

9. Copyright questions appeared repeatedly. One problem centered around the "locally produced" masters that appeared to the experts to be copies from already copyrighted materials. A national center would need to take precautions to see that only noncopyright materials were actually used. The precautions suggested included a statement from the originator and careful checking by a subject matter specialist and the project staff.

Another question centered around the problem of unauthorized duplication of masters for profit. At the beginning of the project it was thought that all materials might be copyrighted by the center and provided with a "not for sale or profit" reproduction legend. When the United States

Office of Education stated that materials prepared under federal funds would be put automatically in the public domain, this question was apparently settled. Only those local producers who are willing to contribute their materials to the public domain would be included. This will not apparently be an obstacle to the success of the project.

10. A credit line on each copy of the master, but not apparent on the project image, seemed to be the best method of recognizing the originator of the master. The similarity to authored professional articles was cited.

11. Brief utilization notes of some kind would be necessary with many masters. The originator of the master in most cases would know more about the concept visualized on the transparency than the teacher who selects the transparency from a repository. Each master will be cataloged and coded according to the McMurray USOE project instrument and a punched card will be prepared.

12. Mounting instructions for the user of the service would be essential when various colors and overlays are used. At this time there is little standardization on this aspect of transparency mechanics.

13. Translucent paper with dense black ink is preferred for the mass distribution of copies of masters. There may be a better way in the future. This system would lessen direct competition with commercial transparency makers. It would also promote selectivity, adaptation and creativity at the local reproduction centers. A prepared transparency has little felxibility. A paper master can be adapted in many ways to a particular teacher's unique situation. It also means that distributed materials are very low in cost and only converted to more expensive forms when actual use is planned.

14. Conference participants and consultants strongly urged a program that would stimulate teachers to create their own transparencies, and improve and expand local media centers so that needed materials and equipment would be readily available for every teacher. The availability of large numbers of masters would create a demand for facilities to use them.

15. The horizontal eight by ten format was preferred by 62% of the respondents to the questionnaire. Twenty-eight percent preferred the vertical format. If the national center standardizes on eight-by-ten horizontal format, copies can be used on any common projector and screen.

It is possible to change existing vertical masters to horizontal copies with little difficulty when plates are made for offset duplication. Some moves toward standardization of format are evident in the industry and a national transparency center should adopt standards when available. Any user who prefers vertical format can still use the horizontal materials without any difficulty.

16. Of 328 questionnaire respondents, 230 or 70% were in favor of establishing a national center to make locally prepared transparencies available to others. Only six were actually opposed to the proposed project.

As part of our contract we prepared a proposal for a national demonstration project to test the feasibility of collecting, evaluating, duplicating and distributing reproducible paper copies of locally prepared masters. The reply to this proposal was:

> "The staff of the Division of Research Training and Dissemination has carefully studied your draft proposal for a '....demonstration project to make locally produced transparency materials and techniques available to educators.' I regret to inform you that it is our decision not to provide support for this project, since current priorities of the Division place emphasis upon activities other than support for pilot distribution centers of the type proposed.
>
> "We are grateful for your continuing interest in the dissemination programs of the Bureau of Research."

This would seem to indicate that our work is done under federal sponsorship, and that if anything further is to develop then it should be done on a regional or state basis.

Very truly yours,

s/Raymond Wyman

Raymond Wyman
Professor of Education

APPENDIX 2

INVITATIONAL CONFERENCE
ON EDUCATIONAL TELEVISION
FOR THE PUBLIC SERVICE

MEDIA DEMONSTRATION

Boston, Massachusetts March 1966

Social Security Administration

35MM MAGNETIC TAPE SERVICES

1. Art of Supervision, The

   This unit presents a knowledge of the baisc duties and responsibilities of a supervisor--to himself, his subordinates, and his superiors.

2. Equal Employment Policies

   The historical development of equal employment policies; the problems that exist; the government's policies', and the responsibilities of supervision in implementing these policies.

3. Interviewing and Counseling

   The art of interviewing; types and uses of interviews; and the techniques for successful interviewing and counseling.

4. Ladies Please -- Grooming Guides for Career Women

   The importance of being simply dressed, and properly made up for the office job. Includes hints on habits, mannerisms and posture.

5. Maintaining work Flow

   This Program describes procedures for assisting supervisors in devising plans for maintaining work flow.

6. Planning and Organizing Work

   This unit was prepared to provide the first-line supervisor with a knowledge of the importance, methods, and techniques of planning and organizing work flow.

Side-tape presentations are available on a 5-day loan period from:

Social Security Administration
Office of Administration
Division of Employee Development
Room 1-B-20 Operations Wing
6401 Security Boulevard
Baltimore, Maryland 21235

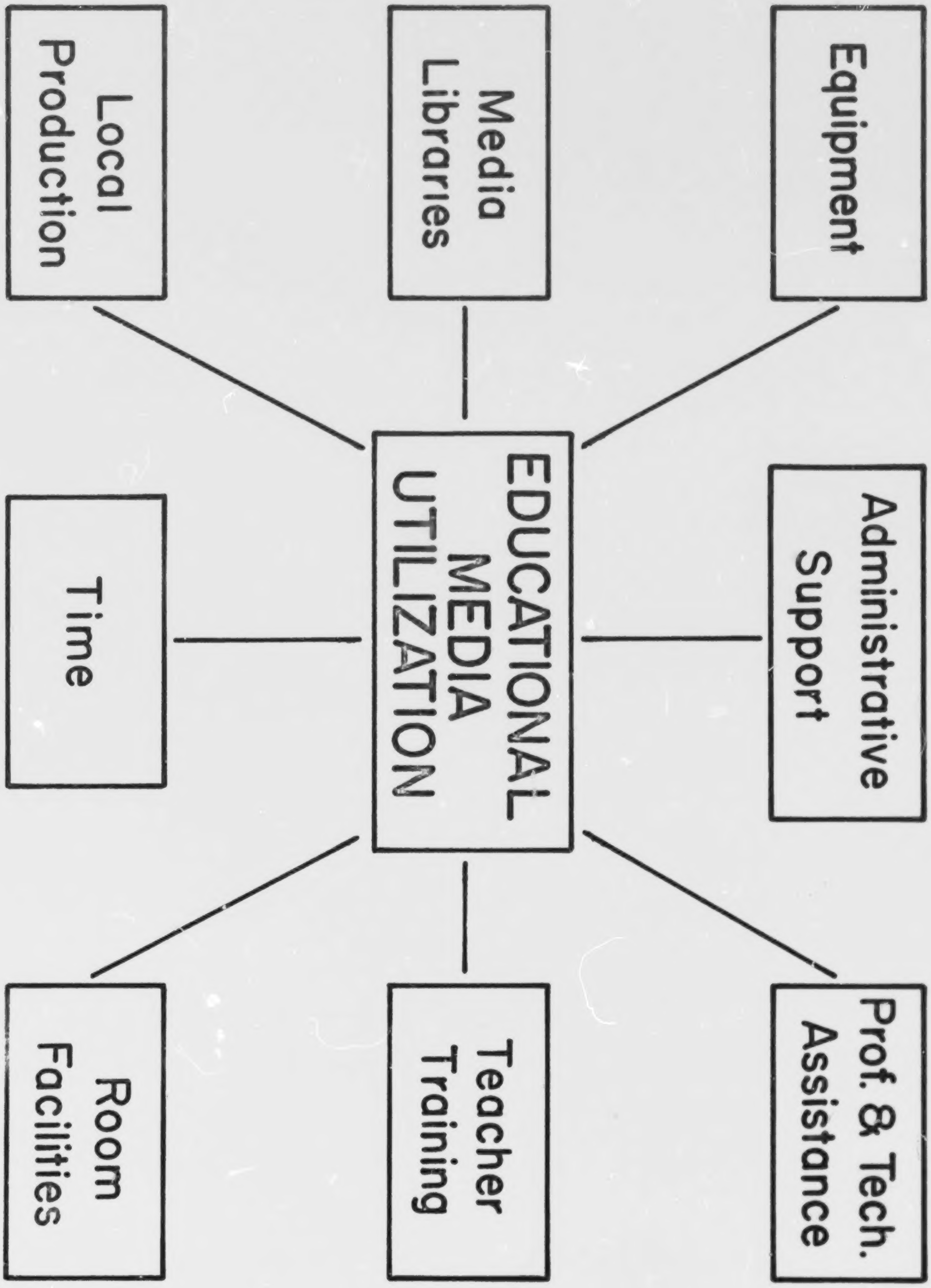
SUPERVISORY TRAINING HANDBOOK

The manuals contain an outline of illustrated material for use as an aid to the development and use of projection transparencies; a bibliography, a detailed lesson guide, and pertinent handouts.

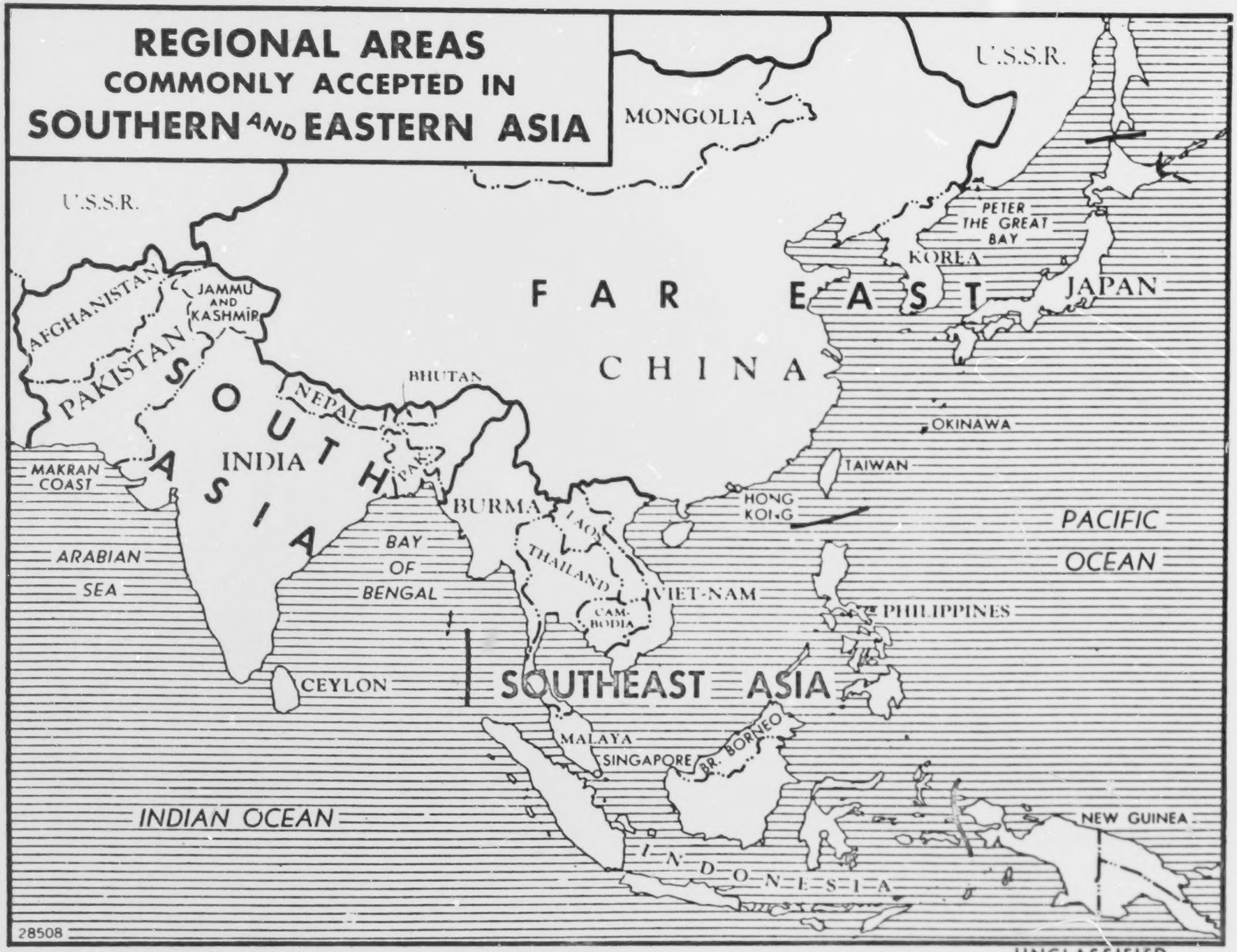
These publications are for sale by:

The Superintendent of Documents
U. S. Government Printing Office
Washington, D. C. 20402

		Price
1.	Art of Supervision	$0.25
2.	Employee Conduct	$0.30
3.	Equal Employment Policies	$0.30
4.	Fringe Benefits	$0.30
5.	Interviewing and Counseling	$0.25
6.	Maintaining Work Flow	$0.25
7.	Planning and Organizing Work	$0.20
8.	Training: Responsibility for Work Improvement	$0.30


EDUCATIONAL MEDIA UTILIZATION
Equipment
Media Libraries
Local Production
Administrative Support
Time
Prof. & Tech. Assistance
Teacher Training
Room Facilities

REGIONAL AREAS COMMONLY ACCEPTED IN SOUTHERN AND EASTERN ASIA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PAK.
FAR EAST
CHINA
PETER THE GREAT BAY
KOREA
JAPAN
OKINAWA
TAIWAN
HONG KONG
MAKRAN COAST
ARABIAN SEA
BAY OF BENGAL
BURMA
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CAMBODIA
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PHILIPPINES
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24 AUGUST 1961

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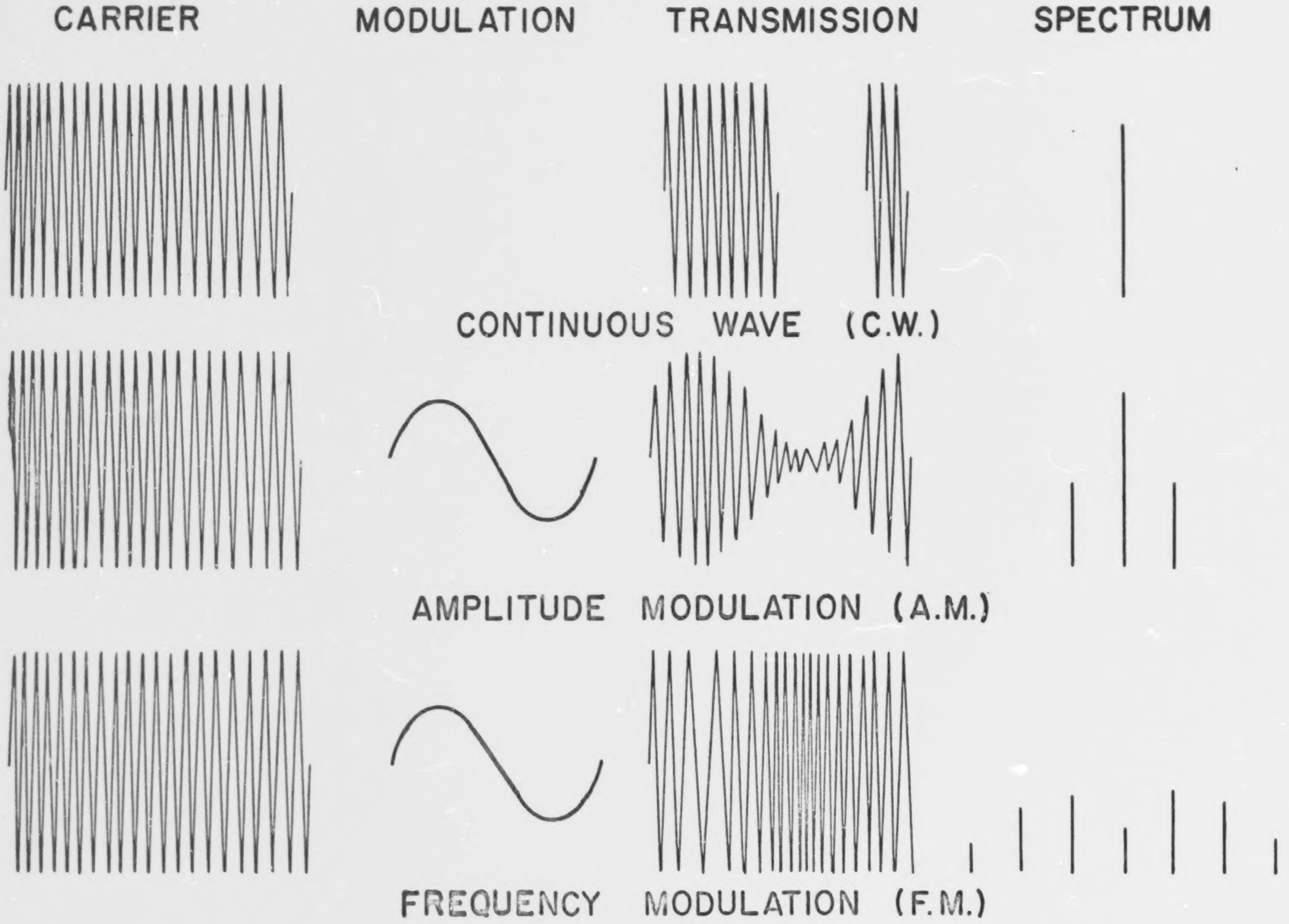
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SPECTRUM
CONTINUOUS WAVE (C.W.)
AMPLITUDE MODULATION (A.M.)
FREQUENCY MODULATION (F.M.)

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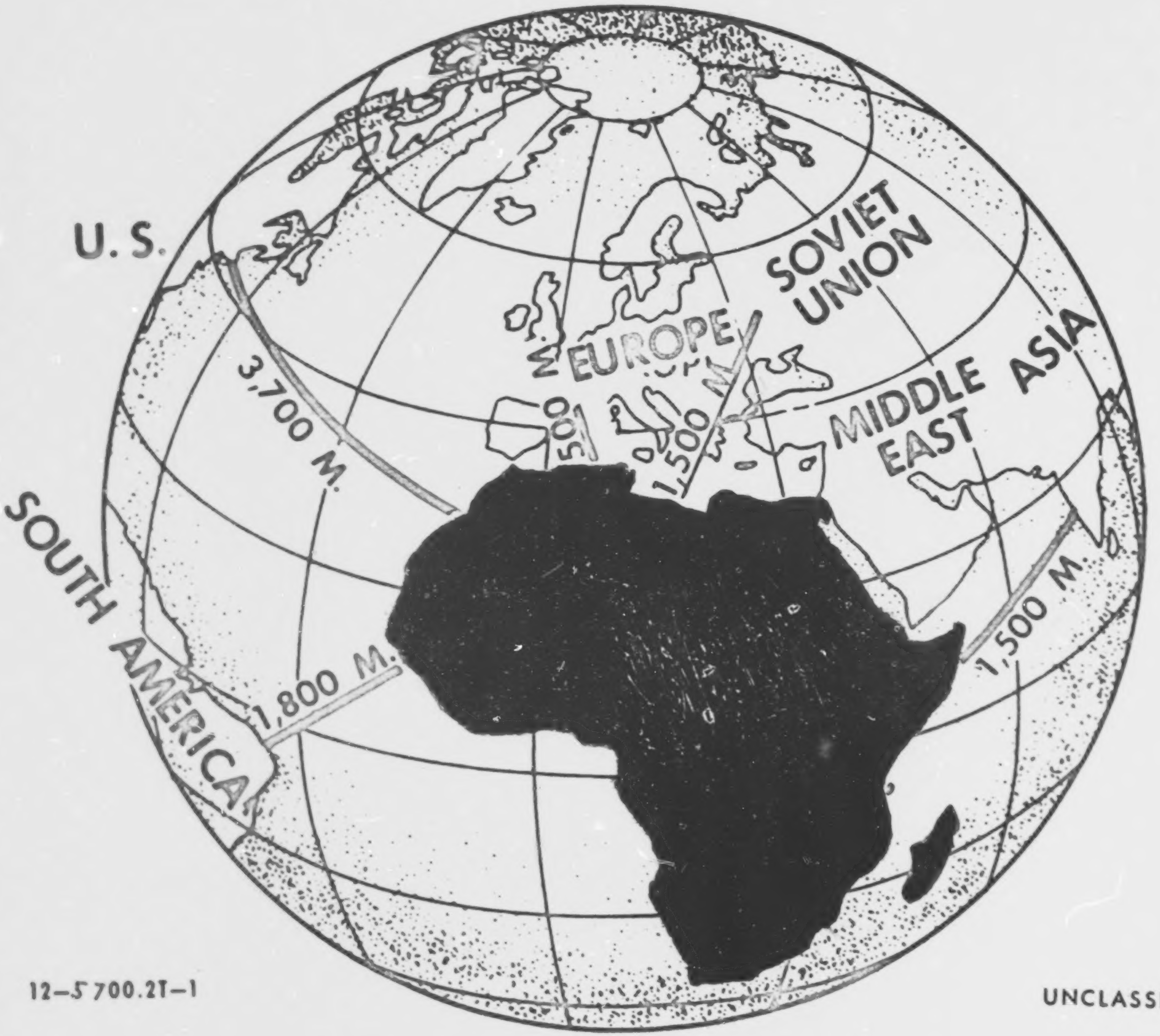
AFRICA IN GLOBAL PERSPECTIVE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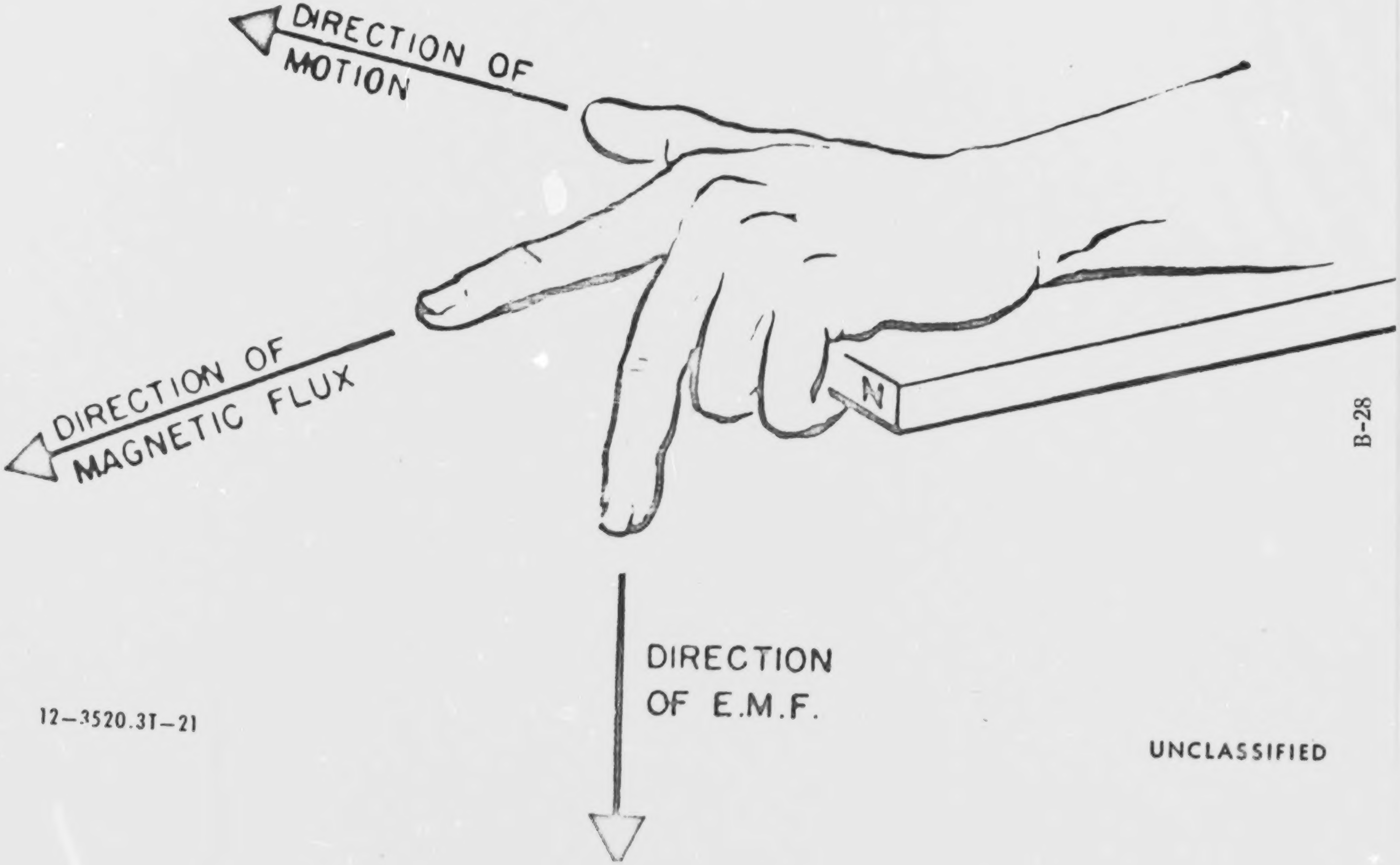
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TRANSPARENCIES FOR OVERHEAD PROJECTION

An Opportunity for Business - Industry - Education Cooperation

Raymond Wyman
Audiovisual Center

University of Massachusetts, 01003

The overhead projector is now the most purchased and most wanted piece of audiovisual equipment in education. It is rapidly moving from an optional, supplementary, and portable device to a required, integrated, and permanent classroom aid. It is paralleling the history of the chalkboard which revolutionized classroom teaching as it became a regular fixture.

The overhead projector and permanent tilted screen have many characteristics that please imaginative and creative teachers. They can face the class and project large images for a class in a normally lighted room that invites interaction. Transparencies can be woven into a presentation as needed to explain, illustrate, diagram, or emphasize a point. Material can be added, subtracted, or pointed to on the stage of the projector. There is one big disadvantage. Transparent material must be used on the overhead projector. Opaque projectors or reflectoscopes will project ordinary paper materials, but they must be used in darkened rooms with far less flexibility.

Teachers with overhead projectors are looking for suitable transparencies in nearly every grade and subject area to supplement and improve upon their crude, grease pencil chalkboard substitutes.

More than forty companies are now producing transparencies for the school market; but, as with all other audiovisual materials, there never seems to be enough of the right materials available at the right time and place. Commercially prepared and mounted transparencies are also rather expensive.

Paralleling the rapid growth of overheads in classrooms is the rapid growth of duplicating machines in audiovisual centers and school offices. It has recently become very easy for a teacher to make a transparency in seconds from almost any printed paper that has desirable teaching content so arranged that it can be read and understood when on a screen before a group of students.

A number of business and industry public relations or education offices have been asked about availability of sponsored transparencies or paper materials suitable for local production of transparencies that would be useful in education. Almost nothing seems to be currently available.

There would seem to be a good opportunity for the business-industry friends of education to provide transparencies or paper materials that were suitable for transparency production.

Many business-industry training programs and management seminars already make wide and good use of overhead transparencies. (The makers of machines and transparency materials tell me that they are good customers.) Some of these transparencies might easily be provided with a credit line and made available to education.

The easiest and least expensive way for business and industry to aid overhead projector users is to revamp their literature designed for education so that key parts of it can be readily reproduced in readable and understandable form.

The most universal paper material for transparency making is dense black ink on one side of tracing paper. This can be copied by diazo, thermo, and transfer machines. Black ink on both sides of ordinary paper can be copied by thermo and transfer machines. Colored ink can be copied by two step, wet process or electrostatic machines. Most schools would be happy with the second alternative, which is very easy from the printing standpoint.

Most transparencies now used are high contrast because continuous tone and half-tone materials do not yet reproduce well as transparencies.

Overall size, type size, and detail are very important because almost no schools have the equipment, skill, and time to enlarge or reduce sizes.

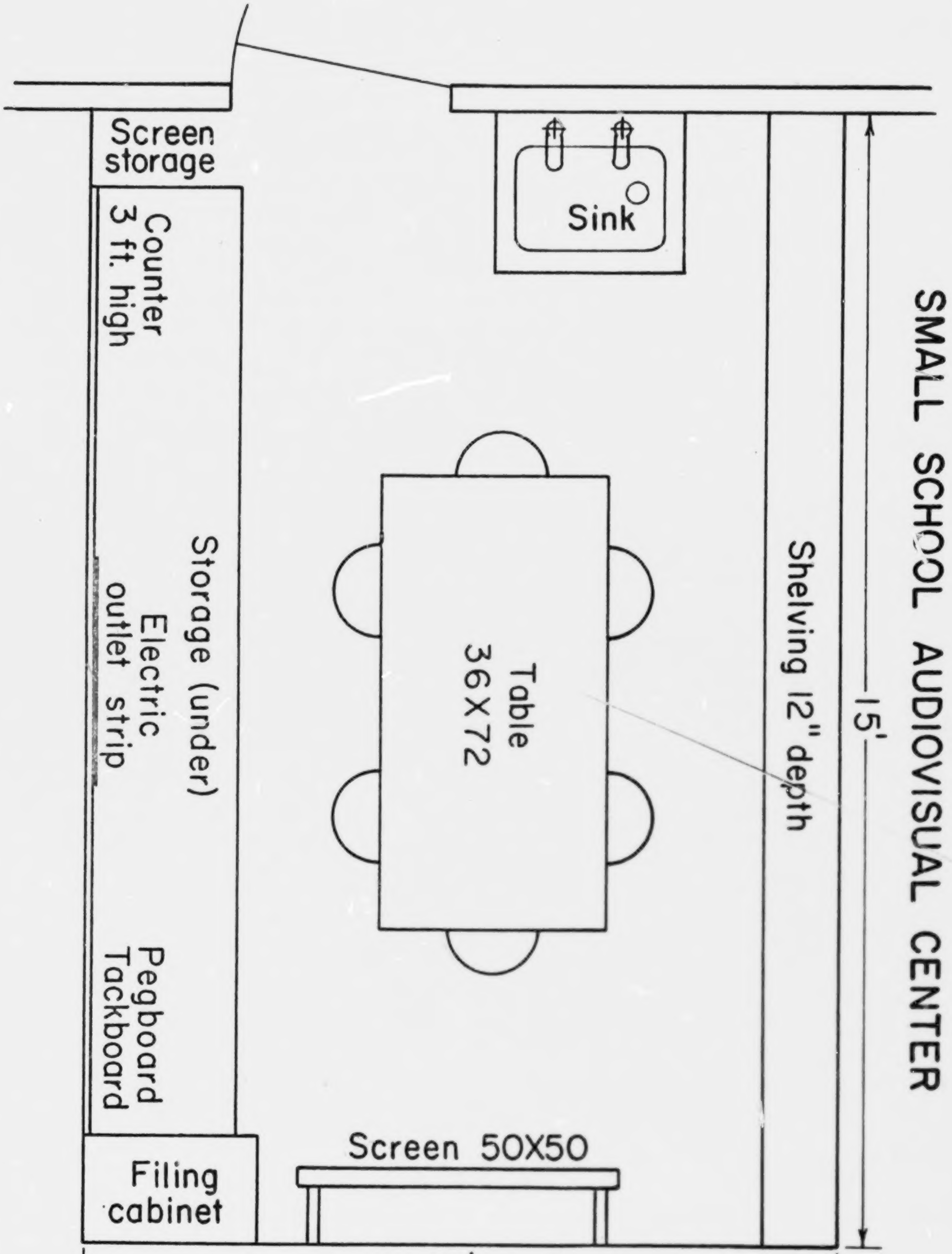
A projected image of about 71/2x10 inches is most commonly wanted. Most users will accept either vertical or horizontal orientation, but some strongly prefer horizontal transparencies so that the whole image can be seen by every student in a low ceiling room.

The smallest type size recommended is about 3/16" high, although smaller type size can be read if the screen image is large, or students are close to it.

Materials to be projected are normally simpler than booklet materials because they are to be explained by a teacher while projected. (The teacher may need supplementary explanations.)

Many sponsored materials are copyrighted and teachers are becoming aware of infringement with their copying machines. It would seem wise for sponsors to add a note under the copyright notice permitting and inviting educators to make paper or transparent copies of the material with credit to the source.

Sponsors who have added so much to education by providing films, filmstrips, recordings, samples, posters, and booklets have a new and exciting possibility in the area of materials for overhead projection.



SMALL SCHOOL AUDIOVISUAL CENTER

Screen storage
Counter 3 ft. high
Storage (under)
Electric outlet strip
Pegboard Tackboard
Filing cabinet
Sink
Table 36X72
Shelving 12" depth
Screen 50X50
15'
10'

THE OVERHEAD REVOLUTION

Ronald Fredrickson and Raymond Wyman
School of Education, University of Massachusetts

Education took a giant step forward about 1825 when the chalkboard rather suddenly and dramatically changed from a portable, optional and supplementary educational device to a fixed, required and integrated part of the classroom teaching program.

No audiovisual device has yet come close to such overwhelming acceptance. Thirty years of research, experimentation and promotion have failed to make tapes, movies, filmstrips or slides generally incorporated into the classroom procedure. They remain portable, optional and supplementary.

The chalkboard has at last a competitor. The overhead projector and its tilted or angled screen show strong tendencies toward becoming standard classroom equipment for use at any moment by any student or teacher with a visual message to communicate to the group. Recent studies by the Bureau of Social Science Research[1] and School Management[3] magazine have pointed out the rapid growth in ownership of this device, and more importantly, the projected purchases of it during the next few years.

The 1961 study conducted by the Bureau of Social Science Research showed that the sampled schools needed 211.5% more overhead projectors than they presently had. This was significantly higher than for any other piece of equipment.*

School Management magazine reported in its study that 3.08 million dollars was spent on overhead projectors by 52.07% of the nation's school districts in 1962-63. One year later in 1963-64, the School Management survey reported a total of 5.07 million dollars being spent for overhead projectors by 62% of the nation's school districts. This increase in expenditure of 1.09 million dollars was greater than for any other media audiovisual equipment included in the survey.

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*A most recent follow-up study on actual purchases conducted by Eleanor P. Godfrey of the Bureau of Social Science Research is indeed confirming this dramatic increase in the purchase of the overhead projector.

The obvious extension of this trend is to purchase one overhead installation for each existing classroom and to specify such an installation for each new classroom. Many audiovisual specialists have already accomplished this goal.

More than forty companies now produce finished transparencies to be purchased by schools to use on the overhead. These started as low volume, high cost items. As the demand increases, they are being printed by low cost, high speed methods with resultant lower retail costs. Schools may soon have individual libraries of transparencies for immediate uses.

Another development that has promoted overhead use is the availability of many paper masters from which teachers can make their own transparencies. Translucent paper with dense black ink on one side permits local duplication onto plastic with any of the transparency-making machines.

Schools are also installing their own production equipment so that teachers are encouraged to create their own transparencies that can be used with effectiveness and pride. It is no secret, however, that good local production is time consuming and requires personnel, facilities, tools, and skill. This was pointed out in EDUCATION SCREEN AND AUDIOVISUAL GUIDE by Henry Ruark in an article entitled, "It's IMC for 1963."[2]

Many transparencies created originally by teachers for use only in their own classrooms are of such quality that they should be available to large numbers of teachers. Samples can be seen in many schools throughout the nation to support this claim.

The United States Office of Education (NDEA VIIB) has contracted with the University of Massachusetts to make a national survey to determine what teachers have actually produced for the overhead projector that might be available and useful to a large number of teachers.

Approximately 600 teachers and audiovisual personnel from schools and colleges in the 50 states have been identified as likely owners of valuable locally produced transparencies. They were found through periodicals, professional associations, state audiovisual supervisors, audiovisual leaders, graphics specialists, and the commercial suppliers of the materials used.

Each of the 600 will be asked by individual questionnaire to indicate what he actually has produced (not reproduced) that might be useful to others. Each will also be asked what methods he used, which size and format he prefers, and other technical details. A random sample of locally produced transparencies will be collected to study the quality of reported transparencies.

The 600 selected producers of teaching transparencies will be asked questions about the desirability and possibility of setting up a national transparency collection, duplication and distribution center. Such centers are already operating for audio tapes and television tapes. There is an opportunity to improve education at all levels if the local producers of quality transparencies share their materials with others through a nonprofit center.

There is some concern that the availability of many transparencies or masters for making them might stifle creativity and continued local production. However, it appears just as plausible to think that teachers will feel encouraged to start producing transparencies of their own as well as using materials from others.

There are many problems that need to be solved. Technical and content standards for acceptance of materials for duplication must be worked out in detail. There is need to avoid reproduction of mediocrity. To edit ot not to edit to "improve" materials is another question. The question of copyright has arisen. The possible competition with commercial transparency producers has caused objections from some and congratulations from others. One company spokesman remarked that, "Anything that promotes overheads is good for us." Before a center is established, there are many other undetermined problems to be studied.

To resolve some of those problems two conferences, one for subject matter specialists and one for transparency experts, are scheduled for December 1965, at the University of Massachusetts in Amherst to consider all of the materials and ideas obtained from the survey and to make recommendations concerning the establishment of a national transparency center.

The overhead projector can do most to aid classroom communications when it is supplied with a constant stream of good transparencies. Such a supply appears to be within sight.

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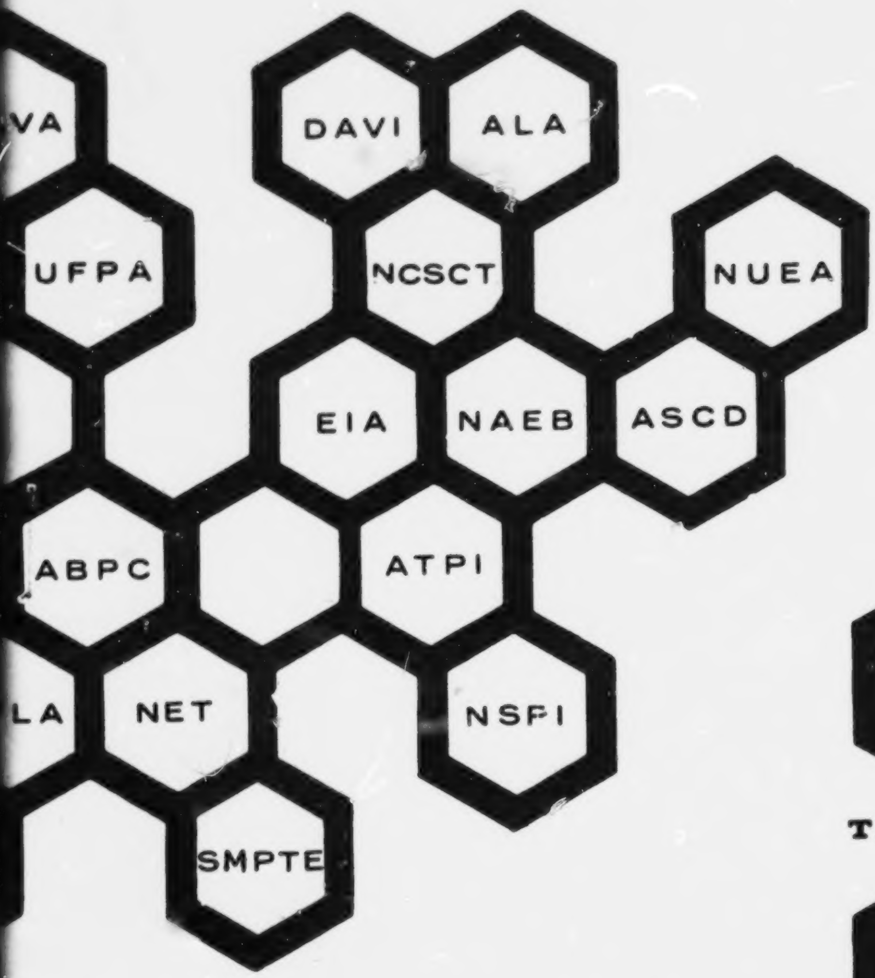
APPENDIX C


VA
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E M C

The Educational Media Council

FINAL REPORT

Project No. 5-0080
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A STUDY OF THE CONCENTRATION OF EDUCATIONAL MEDIA RESOURCES TO ASSIST IN CERTAIN EDUCATION PROGRAMS OF NATIONAL CONCERN

PART II: EDUCATIONAL MEDIA AND VOCATIONAL EDUCATION

May, 1967

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE

Office of Education
Bureau of Research

GUIDANCE, EDUCATIONAL MEDIA, AND VOCATIONAL EDUCATION

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Introduction

The purpose of this paper is to provide a perspective for professional partnership on the part of those who work in guidance, in educational media, and in vocational education. The common thread of concern used in tying such three diverse professional areas together will be the nature and needs of students and prospective students of vocational education. If these students are to become the kinds of productive citizens our increasingly complex society desires, this and many other kinds of professional partnerships will be necessary. We must quickly move to recognize our separate weaknesses and our coordinated strength.

Any brief presentation aimed at a very broad topic is committed to incompleteness at the outset. This paper will attempt a discussion of only a small part of guidance, a still smaller part of educational media, and only one of several parts of vocational education. Such planned narrowness is aimed at attainment of the broadened perspective made possible by partial consideration of each area. While professionals in none of these three fields will find their area of specialization discussed completely, it is hoped that each may find some utility in thinking about a part of their field in relationship to the others.

The approach to be taken will begin with a brief overview of students and prospective students of vocational education in terms of problems they face and characteristics they possess. This brief overview will hopefully serve as background for a more detailed discussion of one program - the Specialty Oriented Student Research Program at the University of Iowa - aimed at helping meet the needs of such students through cooperation of guidance, media, and vocational education personnel.

Vocational Education and Prospective Vocational Education Students

Need For Vocational Training

Students served by vocational education include persons ranging in age from early adolescence to near retirement age - from persons with no job skills to those whose skills are obsolete - from those who have never worked to those who have been employed for most of their lives. This discussion will center around that portion of the vocational education student population properly described as "youth" - primarily those between the ages of 16 and 21 who have recently left or are soon to leave the secondary school hopefully headed towards employment rather than a college or university setting.

Much has been written about such youth in terms of occupational problems they face. Several years ago, predictions were made regarding difficulties they would encounter finding employment in the absence of specific job skills.[11] More recent studies have confirmed the accuracy of these earlier predictions.[13] Current predictions of anticipated difficulties facing unskilled youth in securing gainful employment are even more pessemistic than those voiced at the beginning of this decade.[12] At the same time, "success" stories in terms of employment patterns of youth who receive trade, technical, or business training at the post high school level continue to be common.[14]

The pattern of prediction, promise, and process seems consistently obvious. In brief, it is as follows. The secondary school must give high priority to education for adaptability - i. e., to general education - for a large majority of its students. Students leaving the secondary school for immediate entry into the labor market can expect to encounter difficulty in entering and even more difficulty in progressing in this labor market in the absence of specialized occupational skills. Increasingly, the acquisition of specific job skills for these students is seen as appropriate for the post high school years in a trade, technical, or business school setting. Most high school vocational education students must plan to continue their schooling beyond the point of high school graduation in some kind of specialty training center.

These students must have available in form they can understand and want to study understandable facts for educational-vocational decision making - i. e., they need materials produced by educational media specialists. In addition, they will need concrete assistance in wise decision making - i. e., they need educational-vocational guidance. Finally, they need opportunities for implementing the decisions they reach - i. e., they need post high school vocational education. It is in this context that these three fields must view their efforts as cooperative in meeting the needs of such students.

Nature of Specialty Oriented Students

But how should we proceed to provide help to these students? How can these students be expected to proceed in helping themselves? What can we learn from thoughtful study and consideration of these students that can be translated into guidelines for action on the part of all of us? Questions such as these seem eminently appropriate at this time. Too many words have been written aimed at deploring the plight of those students who do not seek vocational training and in exhorting youth to do what we believe would be best for them to do. Not nearly enough has been written about these students as persons in terms which may guide our attempts to help them. This is, in part, due to the fact that very few people have devoted their research efforts towards providing understandings of vocational education students. The efforts of the Specialty Oriented Student Research Program have, since early 1962, resulted in accumulation of approximately two million bits of information collected from approximately 10, 000 such students enrolled in private trade, technical, and business school settings. While, because of lack of research funds, these data remain largely untapped in terms of studying students, there are some generalized perceptions resulting from our research efforts and observations of these students which may be worth voicing at this time.

One note of caution is in order prior to discussing this series of largely subjective impressions of vocational education students. There is danger in speaking of any student characteristic associated with members of any grouping or classification in that some seem always to infer that the characteristic must be found in all members of the group and is absent in members of any other group. It must be clearly understood that the range of individual differences existing among various groups of students is probably almost as large as the range within members of any group. When we speak of one group - say vocational education students - as possessing or tending to possess certain characteristics, we must always do so with the two phrases "on the average" and "compared to" in mind. That is, while generalizations may be appropriate for a group, there will be many individuals within the group to whom the generalization would not properly apply and certain individuals in other groups to whom it would. With this caution in mind, some generalized impressions of the approximately 10, 000 vocational education students for whom we now have data will be given.

First, we have gained definite impressions along with some research data that these students do possess definite educational motivations - that they want to learn and will work hard to learn things which are meaningful to them. Furthermore, our original concept of the "specialty oriented" student as one whose educational motivations are oriented primarily around a desire to acquire a skill or set of skills he can use to enter the labor market is being reenforced to some extent from our data. For example, over half of the students we have studied, when asked "What's the biggest difference between this and other schools you have attended in the past?" chose a response which says "Here we study only what we need to know - not things like poetry or history. " We have seen and visited with many students who were underachievers in high school, but who have become industrious, hard working learners in the post high school trade, technical, or business training center. This high level of educational motivation has been observed even in schools where conditions are crowded, where classrooms are old and dirty, and where little personal attention is available to the student. It is a difficult to describe but tremendously exciting phenomenon to observe as we have traveled from school to school collecting our research data and visiting with these students. I am increasingly convinced that the major problem is not one of instilling educational motivation in these students, but rather one of providing educational experiences which capitalize on the motivations they already possess.

Second, we have collected some data demonstrating the presence of such highly desirable personal qualities as independence, self confidence, and persistency in following through on decisions reached in these students, some of which has been reported.[8] While the specific study in which these data were reported was limited to slightly over 3, 000 students attending eleven private business schools, we see the implications of such examples of data as of much broader significance. If readers of this paper find themselves wondering whether these data possess validity or why we bother to report the obvious, the significance of our findings should be apparent. That is, while many persons are prone to accept the general presence of such characteristics on faith and/or "goodwill towards men, " not enough persons are truly convinced that they exist in such parts of our population as represented by vocational school students. A very important part of our research effort is aimed at producing the kinds of evidences regarding such student characteristics which will allow the substitution of facts for faith - of knowledge for belief. These are not persons to be thought of as "second class" in any way - nor are they persons to be pitied, led, directed, threatened, or "sold" on what is best for them. They are worthwhile members of our society - and we have some data to prove it. Again, it is difficult to find words which describe the significance of observations such as these. In a sense, these words may be thought of as a rebellion against those present cultural and societal mores which, in spite of all pious pronouncements, reflect a belief that the "best" thing a student could do is attend a college or university and that this is what the "best" students do. This simply is not true and we are trying to produce a great deal of evidence demonstrating the falsity of these kinds of mores and beliefs.

Third, we have collected and reported some evidence indicating that students attending specialty schools at the post high school level were aware of the need for and thought seriously about obtaining such training while still in high school.[3, 8] Evidently, the kinds of predictions regarding the need for such specialty training did reach some high school students and influenced both their thinking and their decisions. The perplexing question which naturally arises from data such as these is, why hasn't it reached more of the students in today's high schools? That is, why aren't most high school graduates and dropouts who choose to do something other than attend college electing to attend a specialty school of some sort? We have no data to use in answering this question. At the same time, we have some speculations which hold potential for the remainder of this paper. We are currently speculating that this situation exists, in part, because the big majority of high school students have not received pertinent facts and information required for making the specialty school decision. That is, it does not seem reasonable to assume that the relatively small proportion of high school leavers entering specialty school training is attributable to a rejection of the validity of predictions regarding needed occupational skills. Rather, it seems much more reasonable to assume that the need for such skills and knowledge regarding where and how such skills may be obtained has not been made clear to many of today's high school students. Implications of this kind of speculation will form a major part of the second portion of this paper.

Coupled with and intimately tied to the preceding set of observations is a substantial body of data indicating that the bases on which currently enrolled specialty school students decided to enroll leave much to be desired. Of the first 5, 800 students from whom we have collected data, approximately 4, 000 were able to state some reasons for attending specialty training while the remaining 1, 800 either could not or would not do so. These data are currently being examined in a Ph. D. dissertation in process at the University of Iowa. While no exact figures are yet ready to report, it is obvious from analyses already completed that the kinds of thoughtful reflections one would hope to find associated with decision making appear not to have occured in many cases. That is, even those students who, while in high school, decided to enroll in specialty training apparently did so in large numbers based on what most people would regard as insufficient and/or incomplete information. This, too, points to the need for guidance and educational media specialists to work more closely together in serving the needs of these students.

Further Assumptions Regarding Specialty Oriented Students

This discussion would be incomplete, indeed, if the description of specialty oriented students was limited entirely to data and observations growing out of the Specialty Oriented Student Research Program. There are three other basic assumptions - one practical, one philosophical, and one theoretical - which deserve brief discussion.

As a very practical matter, it seems reasonable to assume that specialty oriented students, as opposed to college-bound students, should be properly described as possessing a lower average level of reading ability and a lower average facility for verbal communication. It seems simply logical to assume that educational media used in helping these students make educational-vocational decisions should be constructed keeping this expected lower average level of reading ability in mind. The ability of media specialists to picture facts and concepts in ways other than the printed word is, in a very practical sense, one which we assume will be very much needed in the guidance of specialty oriented students. The second practical consideration is simply one of recognizing that specialty oriented students are not, on the average, as verbally facile as are the so-called "college-bound." It is not easy to find ways of helping these students express themselves verbally in the counseling interview. Counselors need materials hopefully produced by media specialists aimed at encouraging verbal communication between the counselor and the counselee in the counseling interview. We have no research data to support either of these practical assumptions. At the same time, we have a strong feeling that we would find little difficulty having practicing school counselors agree with them. These represent operational problems the school counselor faces daily as he attempts to help students for whom trade, technical, or business training may be appropriate.

In a philosophical sense, the time has arrived when concepts of optimal development of talent and maximal freedom of choice must be operationally extended to all students in the secondary school - not just the "intellectually able." Differences in both students and in educational opportunities must be considered in examining this issue. It is not difficult to do so in terms of the very bright student headed towards the university setting. A very great deal of attention has been devoted to problems of helping this segment of our population develop their talents to the maximum - especially since passage of the NDEA in 1958. Concepts alluding to "freedom of choice" for the able student often appear to be based relatively more on the notion that the student's abilities have made him free than on the notion that society gives him freedom. To the extent that this basis has some validity, then the student with lesser ability is less free to lead his own life. Morally, this is wrong. Because a student is not "intellectually able" should have no bearing on our concern for either expressing support of his freedom to choose or the importance of his full development and utilization of talent. When certain youth perceive themselves as among the less able, we don't want them to think of themselves as less free or as less responsible for full development of the talents they possess.

American higher education in the college and university setting is ideally suited to fostering concepts of both freedom of choice and development of talent for the intellectually able student. While some geographic discrimination does exist in state supported institutions in terms of resident and nonresident fees, this is not a major deterrant in the availability of wide choice in selection of college for most students. Comparable choice of educational institutions for the specialty oriented student does not exist. Many of the public area vocational schools, for example, limit enrollment largely to students residing in a particular district. Most prospective students either are unaware or distrustful of private trade, technical, and business schools. There is great need to broaden the perspective of specialty oriented students regarding educational opportunity. Unless knowledge regarding both the number and kinds of educational opportunities is greatly increased for these students, they will continue to be handicapped in freedom of choice and development of talents. There is a moral societal responsibility and a major societal need to correct this situation through providing more adequate information to these students.

The theoretical assumption to be included in this discussion centers in part around the concept of delayed need gratification as it applies to specialty oriented as opposed to "college-bound" students. We have a hunch that the specialty oriented student has a far greater need to see the occupational implications of his educational experience than has the "college bound." If our hunch is right, he can be expected to be one who needs to see his tasks as fitting together in terms of an occupational goal. He will, in school, expect much more frequently to express concern if what he is asked to study appears to him to be unrelated or only vaguely related to his hoped for occupational role If counselors visit with him about continuing his education, he can be expected to express concrete and direct interest in details regarding the probable nature of his occupational experiences following training.

A second part of our theoretical assumption is concerned with what we believe is probably a need on the part of specialty oriented students for assurances regarding their probabilities for success. We have a hunch, based on counseling interviews held with such students, that they are very much interested in similarities between themselves and others with whom they may be expected to compete in training. They should be expected to be concerned about the amount of studying expected of them, their chances of finishing the course, and their chances of finding employment once they leave the training center. Many of these students have learned clearly what it means to fail - or at least to be in the lower half of their peer group - during the time they spent in the secondary school We think we can expect them to be much concerned about being able to compete successfully if they enter into specialty training. While their lower average family income may be expected to influence their feelings of financial risk involved in entering training, we suspect their fears of personal risk probably are significantly greater than are financial ones.

The Specialty Oriented Student Research Program And The SOS GUIDANCE RESEARCH INFORMATION BOOKLETS

Introduction

The first section of this paper concentrated major attention on what we have called "specialty oriented" students - the demands society is making of them, their nature, and their needs. At several points, brief mention was made of certain data accumulated in operations of the Specialty Oriented Student Research Program. The primary purpose of this section is to present a brief overview of this research program and an equally brief discussion of one attempt to prepare educational media materials from some of the research facts collected by the research team.

Much fuller descriptions of the research program in terms of its nature and purposes have been previously prepared and are available to interested readers.[1, 2, 4, 5] Similarly, two previous attempts have been made to provide rather complete discussions of the type of educational media discussed here.[6, 7] Therefore, only very brief descriptions will be presented in this section.

The Specialty Oriented Student Research Program

Established in 1962, the Specialty Oriented Student Research Program exists for purposes of collecting, analyzing, and disseminating research data holding potential for use in the educational-vocational guidance of persons contemplating attendance at trade, technical, or business schools operating at the post high school level.

To date, all subjects in the research program have been students attending trade, technical, or business schools at the post high school level. Approximately 10, 000 such students enrolled in 30 private schools and 16 public area vocational schools have provided something in excess of two million bits of information for use in the research program to date. Data collected from these students while in training consists of a detailed biographical information blank and a series of objective tests and inventories. In addition, instructor ratings of these students are an integral part of the data collection process. Approximately six months following training, each student is mailed a 40 item questionnaire asking about post-training vocational experiences.[9] Similar questionnaires are mailed approximately two years following training. While not yet an accomplished fact, the research plan calls for still other mailed questionnaires five years and ten years following training. These data are collected directly by members of the research staff and not by personnel of the schools in which these students are enrolled. In addition to studying students in training in specialty centers, the overall research plan calls for studying high school students considering entry into such training centers.

All data are processed, analyzed, and stored on magnetic tape in the University Computer Center at the University of Iowa. They are then available for a wide variety of research studies aimed at production of new knowledge regarding these students and materials useful in the educational-vocational guidance process. As a longitudinal research program, the process of collection, analysis, and dissemination of research results is seen as a continuing program whose scope and duration will be limited only by success in securing sufficient funds for carrying on the research.

The SOS GUIDANCE RESEARCH INFORMATION BOOKLETS

To present research results in form suitable for use in educational-vocational guidance of high school students represents quite a different problem from that involved in production of research findings. In order to help solve this problem, extensive consultative help has been sought from the staff of the Audiovisual Center, University of Iowa, directed by Professor Lee W. Cochran. The particular kind of educational media to be described now represent only the first of several approaches to this problem being considered by staff members of the research program and the Audiovisual Center.

The kind of guidance material produced to date consists of a series of 43 booklets designed for use with and by high school students along with a Counselor's Manual containing suggestions to counselors for use of the booklets. These 43 booklets are called SOS GUIDANCE RESEARCH

INFORMATION BOOKLETS and are published by the Bureau of Educational Research and Services at the University of Iowa for restricted sale to practicing counselors and guidance workers.

Each booklet is thirty-two pages in length and utilizes the same basic format. Beginning with a "Message To High School Students," succeeding sections contain research facts concerning the nature of students, their school experiences, and their post-training vocational experiences. One such booklet has been prepared for each of 43 separate training programs to date. Production of new booklets and updating of the current ones is seen as a continuing part of the total research operation.

Content of the booklets is organized in what we hope is a logical sequence around questions specialty oriented high school students ask their counselors. Questions are listed at the top of each page and answers given by students enrolled in the training program represented by the booklet are reported below in the form of charts, graphs, and cartoons. Liberal use is made both of color and "white space" in presenting the research results. Occasional phrases are inserted for purposes of explaining results but, by and large, the results are presented simply in percentage form in the various kinds of pictorial presentations which are used.

The Counselor's Manual contains many suggestions for counselor use of the booklets in both group guidance and in individual counseling situations. The three major guidance uses suggested for the booklets are: (a) To aid specialty oriented students thinking about continuing their schooling in some kind of trade, technical, or business school after leaving high school; (b) To aid specialty oriented students thinking of a logical series of questions to consider as they try to make decisions regarding specialty training; and (c) To aid specialty oriented students considering attendance at one or more of the training centers whose students are described in the booklets make specific decisions regarding attendance at these centers.

The first of these three guidance uses could obviously be accomplished with many fewer booklets than have been produced to date. Both the second and the third uses, however, demand the production of a great many such booklets if they are to be effectively accomplished on a wide scale. By reporting comparable data for students in different training programs, the high school student can be shown that wide differences do exist among students in various training centers - even when enrolled in the same kind of training program. These differences can be observed by inspecting any single page of a booklet and comparing the findings reported with those on the same page for other booklets.

We have found these differences do exist even when we study what are usually considered highly homogeneous training programs in different settings. Perhaps an example is in order. In 1964, we collected data from 292 students enrolled in eleven different Practical Nursing programs operating under the supervision of the Iowa State Department of Public

Instruction.[10] Each program had been initially established and was regularly visited by a supervisor who is very dedicated to high quality training programs in each setting. We certainly thought that, for these 11 highly similar programs, perhaps we could produce only one booklet representing a combination of results under the assumption that differences would be so slight as to make production of separate booklets unnecessary. When we examined the first 40 items in the booklets, however, we found that 27 or 67.5% were significantly different using a Chi-Square test for independence. With the much higher variability we find in more typical training programs where we have collected data, we are convinced that the production of separate booklets is absolutely essential for accurate reporting of our research results. That is, even were our second and third guidance uses not present, we would still consider this separate booklet production necessary.

Approximately 1500 sets of these booklets have been distributed to date among practicing counselors, guidance supervisors, and counselor educators located throughout the United States. The first booklets were mailed to counselors in the Spring of 1965. In March of 1966, we conducted a study of reactions of counselors who had been using the booklets in their guidance programs. A report of the findings from that study is contained in the next section of this paper.

First Preliminary Evaluation Of The SOS GUIDANCE RESEARCH INFORMATION BOOKLETS

Problem

The SOS GUIDANCE RESEARCH INFORMATION BOOKLETS have been developed around the perceptions presented in this paper and its references. The purpose of this study was to evaluate the validity of these perceptions in terms of reports received from practicing high school counselors who had used the booklets in guidance of specialty oriented high school students.

Sample

The Bureau of Educational Research and Service at the University of Iowa is the sole publisher and distributer of the booklets. As such, it maintains complete records of names and addresses of all persons to whom sets of the booklets are mailed. In March, 1966, a list of all such persons was obtained from the Bureau. From this list, an attempt was made to identify those persons who could be identified by their title and school address as practicing high school counselors. A total of 497 such counselors who had ordered these booklets prior to January, 1966 was identified. A questionnaire called the Counselor Report Form (CRF) was mailed to each of these 497 counselors in April, 1966. By May 16, 1966, usable replies had been received from 288 or 58% of these counselors. It is these replies which form the basis for this report. This is a preliminary report in that, as of this writing, counselor replies are still being received.

Further descriptive information regarding members of this sample is available from certain items contained in the CRF Tabulation of these items revealed that 77% of our respondants are full-time as opposed to part-time counselors. Ninety-two percent work with secondary school students. Their modal age is between 35 and 45 years They work in schools of various sizes with slightly over one-third working in schools enrolling 900 or more students. Seventy percent had used the booklets for six months or more prior to the time they completed the CRF

Instrument

The Counselor Report Form (CRF) is a 53 item questionnaire designed to elicit responses from practicing school counselors with respect to their experiences with the SOS GUIDANCE RESEARCH INFORMATION BOOKLETS. Section I contains 11 items containing counselor and school background data. Section II consists of 9 items pertaining to ways in which counselors have used the booklets. Section III is composed of 14 items concerning counselor perceptions of reactions of high school students to the booklets while Section IV contains 9 items pertaining to counselor reaction to the booklets.

Included in the "Note To Counselors" which precedes the items themselves are the following statements:

> "These BOOKLETS represent a new and untested approach to educational -occupational information. . . we don't know whether our ideas are good ones or not. The only way we can determine this is through feed-back we receive from counselors who actually use these materials with students."
>
> "As a partner in research, it is vital that you recognize the necessity for honesty and accuracy in responses you make on this Form. Remember, our purpose in asking these questions is not to make the ideas behind these BOOKLETS look 'good' or 'bad' Rather, our purpose is to make our ideas 'better' - and keep them from becoming 'worse'."

Counselors were not required to report their names unless they were requesting a copy of the results We feel that, with directions such as reported above and with the protection of anonymity for the counselors, the results presented below can be viewed as representing honest opinions of members of the sample.

Procedures

All data for this study were collected by mail questionnaire. As responses were received, they were key punched and transferred to magnetic tape in the University Computer Center. Computer runs were then made for purposes of determining the number and percent of respondants choosing each of the several responses available for each item. Items which did not lend themselves to machine processing were tabulated and analyzed by hand procedures.

Results: Counselor Use

Ninety three percent of our respondants reported they kept the booklets either in their offices or in the waiting area outside the counselor's office. Only six percent reported keeping the booklets in the school library.

We were pleased to see that 85% of these counselors reported using the booklets during individual counseling interviews - especially in view of the fact that we know they don't frequently use typical occupational information in such interviews. We were equally pleased to discover that 79% of the counselors reported that they let students check booklets out to read at school and 67% allowed students to take booklets home to study. Seventy-six percent of these counselors reported they had read the booklets themselves - and we considered this most unusual as we thought about what practicing counselors usually do with published educational-occupational information they receive.

As might be expected, we were disappointed with some of the reports of counselor use. For example, only 35% reported they had introduced the booklets to students by means of group guidance and only 27% reported they had used the booklets in meetings held with parents of their students. These results indicated to us that different kinds of educational media are needed in order to achieve these guidance purposes.

Results: Student Reaction

If these counselor reports are accurate and if counselor perceptions of student reactions have some validity, we can say that student reaction is generally favorable. Ninety-eight percent of these counselors reported students were able to read the booklets with understanding and 86% reported that the booklets seemed to appeal to high school students.

The three general purposes of the booklets appear to have been attained to some extent in terms of student reaction. Specifically, (a) eighty-nine percent of the counselors reported use of the booklets seemed to encourage students to think more seriously about themselves and their plans for training beyond the high school; (b) ninety-one percent of the counselors reported use of the booklets appeared to help students better organize their thinking with respect to questions they should ask about training programs; and (c) fifty-eight percent of the counselors reported use of the booklets appeared to help some students make specific decisions regarding attendance at some particular training program after high school. In view of the very small number of booklets available, these results were what we expected and hoped they would be; i. e., we had hoped the first two purposes would be attained relatively better than the third at this time To achieve the third purpose well would demand many more booklets than we have produced to date.

Several items pertained to student reaction concerning format of the booklets. For example, 78% of the counselors reported that use of multiple colors in the booklets appeared to be worthwhile so far as student reaction was concerned, 88% reported that students could read the charts and graphs without the necessity for interpretative comments on our parts, and 93% reported that students reacted favorably to reporting names of specific training programs in specific schools and would prefer this over not reporting such names. Ninety-six percent of the counselors reported that our occasional use of cartoons seemed to have a positive appeal to the students. Fourteen percent reported specific charts and/or graphs some students had difficulty understanding and 16% reported additional questions students asked which were not answered in the booklets.

Results: Counselor Reaction

The final section of the CRF asked directly for reactions of practicing counselors to the booklets. Again, results were generally encouraging although we were disappointed with respect to certain items.

Among our more encouraging results were the following. Ninety-three percent of the counselors reported that the booklets have helped them better meet the guidance needs of their students who will not go on to college. Ninety-four percent reported that content of the booklets represents new knowledge useful in educational and vocational counseling. Seventy-eight percent reported that use of the booklets encouraged students to talk more freely and have more productive counseling sessions with their counselors. Eighty-three percent reported the booklets to be useful in encouraging students to make decisions for themselves rather than depend on counselor opinion. Ninety-three percent reported that having these booklets encouraged them to further supplement their library of post high school training opportunities for prospective trade, technical, and business school students.

We had hoped that restricting opportunity to order booklets to practicing counselors thereby eliminating direct orders from students and parents would have several positive results. Our hopes were not well realized here according to these counselor reports. For example, only 20% reported that this practice has encouraged more parents to contact them and only 58% reported it had encouraged more students to seek out the counselor for help. Similarly, only 46% reported this practice had encouraged representatives of trade, technical, and business schools to work more closely and cooperatively with the school counselors. On the other hand, 88% reported that this practice had given counselors better control over possible misuse of the booklets.

We were worried that having so few booklets available might handicap counselors in being able to effectively use those which were available. Apparently, there was some reason to worry as almost half (49%) of these counselors reported themselves handicapped by the small number of booklets we have produced to date. Including names of specific schools did not seem to handicap counselors, however, as 93% reported this practice had not placed them in a position where they appeared to be recommending particular schools to students and parents.

Discussion

Taken as a whole, it seems to us that these results provide clear encouragement for the rationale behind these booklets presented in this paper and for continuing the production and distribution of these booklets. We feel that these results demonstrate that practicing high school counselors who work with the kinds of students for whom these booklets were prepared have generally indicated their agreement with our approach by the responses they provided us. It would seem to us that it would be extremely difficult to conclude otherwise.

We also recognize that these results can in no way be taken as evidence of the validity of our approach. To produce this kind of evidence would demand a series of carefully designed experiments involving different experimental treatments on the part of counselors with high school students and later follow-up of the students in terms of their post high school behavior. We have already designed such experiments and sought funds with which to carry them out. To date, we have been completely unsuccessful in obtaining such funds.

We are also aware of the fact that these results do not include all of the practicing counselors to whom the CRF was mailed. Perhaps, when all results are in and we make a final report, these findings will not appear so positive. We can also agree with those readers who may contend that perhaps our respondants did not report their true perceptions. Anything is possible. At the same time, we have a strong feeling that these results can be taken as honest counselor perceptions. That is, we must state our belief that our respondants tried to give us accurate and honest responses.

At this point, it seems to us that our general approach appears sound enough to justify moving ahead with development and tryout of a wide variety of additional kinds of educational media for presenting research results to high school counselors, students, and parents. We are highly hopeful that we will be able to find ways of developing, in cooperation with our Audiovisual Center, such things as films, slides, filmstrips, charts and posters, and programmed learning materials in which certain of our research results are presented. We are well aware of the fact that the booklets we have represent only one of several kinds of educational media holding potential for better meeting the guidance needs of vocational education students. These students deserve high priority in terms of cooperative working relationships between guidance, media, and vocational education specialists. It is hoped that this paper may help stimulate the development of such relationships in a number of settings. The counselor education department and the Bureau of Audiovisual Instruction at the University of Iowa are dedicated to this objective. We hope others will develop a similar dedication.

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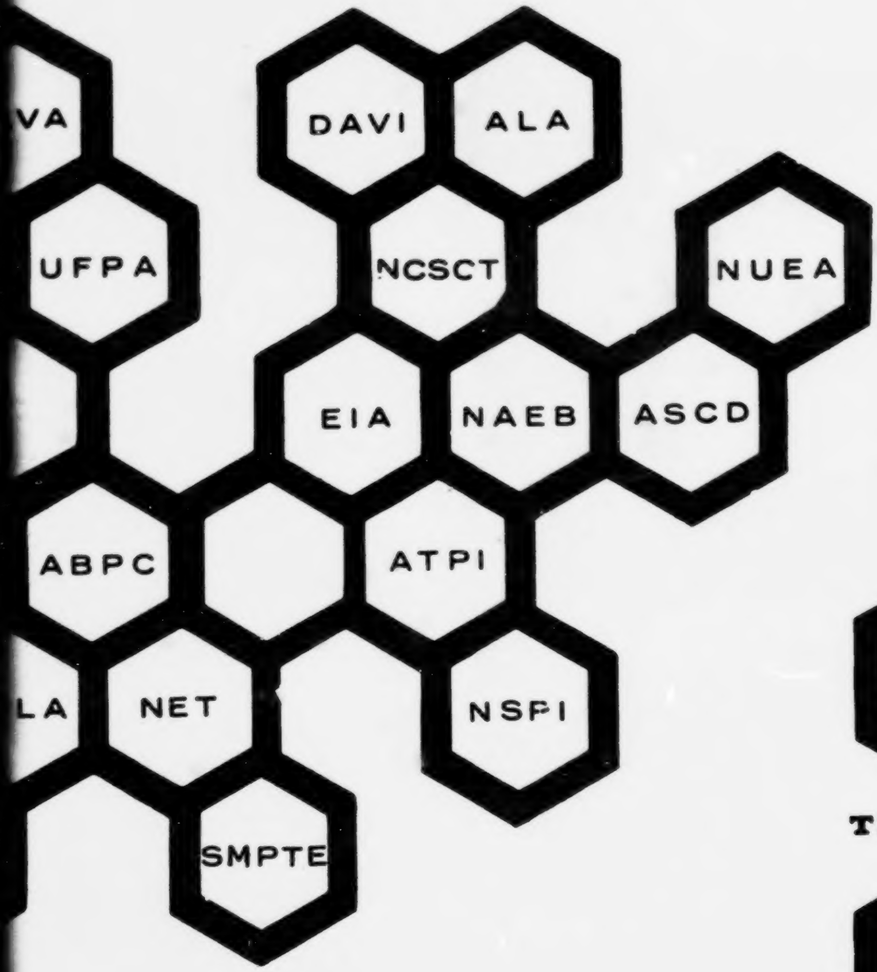
APPENDIX D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The E M C Educational Media Council

FINAL REPORT

Project No. 5-0080
Contract No. OE 5-16-032

A STUDY OF THE CONCENTRATION OF EDUCATIONAL MEDIA RESOURCES TO ASSIST IN CERTAIN EDUCATION PROGRAMS OF NATIONAL CONCERN

PART II: EDUCATIONAL MEDIA AND VOCATIONAL EDUCATION

May, 1967

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE

Office of Education
Bureau of Research

STRATEGIES FOR OPTIMIZING THE APPLICATION OF MEDIA TO VOCATIONAL AND TECHNICAL EDUCATION CURRICULA

Robert E. Taylor
and
Virgil E. Christensen

Introduction

This paper is primarily concerned with optimizing the application of educational media to Vocational and Technical Education curricula. It includes examples for utilizing media in these instructional areas and addresses itself to alternative strategies for implementation. The assumption was made that Vocational and Technical Education is "underdeveloped" in terms of adequately exploiting the full range of possibilities inherent in modern educational media and technology. It is recognized that the general setting of Vocational and Technical Education today provides a favorable climate for further developments in these curricular areas.

This paper is not a research review or an evaluation of past media efforts. Neither is it an exhaustive treatment of all media. Rather, it is an overview designed to provide examples, stimulate thinking, identify priorities and alternatives, and perhaps provide an intuitive leap forward in the applications of media to Vocational and Technical Education curricula.

It should be mentioned that the writers are not media specialists but, rather, are instructionally oriented and primarily concerned with the applications of media to the Vocational and Technical Education area.

The sections which follow are concerned with the broad setting in which Vocational and Technical Education functions, the general benefits of applications of media to diverse and varied instructional situations, and strategies for optimizing applications to the Vocational and Technical Education curricula.

The Climate for Vocational and Technical Education

In properly considering the many factors and forces impinging on the optimal application of media to Vocational and Technical Education programs, attention needs to be given to the milieu in which these programs are operating and conceivably will be operating in the future.

It is evident that the nation is literally rediscovering education. Education is being viewed as an instrument of national policy, as a vehicle for achieving broad social goals. We are living in an age of conscious social change, with schools assigned a central role in effecting this change.

Further, the full range of resources of the federal government are being amassed in a multifaceted attack on a broad range of social problems. This increased interest and investment by the many departments of government is reflected in terms of new organizational structures, new relationships, increased funding and resources, and improved communication and interaction among relevant agencies. Obvious indications of this increased activity are evident in the Regional Educational Laboratories, research and development centers, state research coordination units in Vocational and Technical Education, Educational Research Information Center (ERIC) clearinghouses, supplementary service centers, and improved library facilities. The impact of these efforts has caused a ripple throughout the educational community, resulting in increased emphasis on effective leadership from state departments of education, the development of educational research structures within states, and the formation of educational compacts between states.

In essence, these emerging forces and factors mean increased interest and attention, improved funding, and the capacity to focus a wider range of resources and talents on critical problems in education, of which Vocational and Technical Education is an essential part.

The increased investment by government at all levels is a recognition of the impact of accelerated social change, the imbalances it creates, and the implications it has for the entire educational community. The changing nature of society and of science and technology require an increased responsiveness, adaptiveness, and flexibility on the part of the entire school community. Society increasingly looks to the schools as a means of implementing national goals and solving or ameliorating problems growing out of the following socio-economic trends.

**The pace of technological change is accelerating through more pervasive utilization of computers and other processes of automation.

**Technological changes are creating a number of imbalances in employment which ultimately find their way to the doorsteps of schools.

**The advance of automation and technology places additional urgency upon upgrading and retraining significant portions of the nation's labor force.

**The increased productivity per worker is based in large measure on the rising educational level of workers.

**Increasing numbers of women are entering and re-entering the work force.

**There is a shift from blue collar to white collar workers and from production and manufacturing positions to increased numbers of service workers.

**Mobility among workers is increasing.

**Use of systems in government and industry is increasing. The full impact of the "systems" approach has not yet been realized in the educational community.

**The benefits of technology resulting in increased leisure time continue to spawn additional problems for education.

**There are significant changes in the age distribution of the population, with a greater proportion of people under 25 and over 65.

**It is recognized that education is a continuous process and that individuals need to be made effective, self-directing learners to perform effectively as citizens and economic contributors. Schools face the responsibility of preparing individuals to become "lifelong students" and to learn more about learning as it applies to them individually. They also face the responsibility of developing the capacity of individuals to take advantage of the self-study opportunities that will become increasingly available.

**The diffusion of educational facilities throughout society, with schools likely to become 24-hours-a-day and 12-months-a-year institutions, will provide opportunities for an individual to maximize use of time for self-improvement and improved vocational efficiency. Learning cubicles where individuals can effectively use auto-instructional materials may be situated at factories or other places of employment, airports, apartment buildings, public transportation, and other facilities frequented by large numbers of people.

**There are indications that the trend toward decentralized neighborhood schools is shifting toward community educational centers and/or educational parks where the "critical mass" of essential resources, human and physical, can be assembled to maximize the learning process in a given community or attendance area.

**There is a strong likelihood that training will become one of our largest employment areas. Recognizing the economic returns on investments in human resources, employers will assign increasing numbers of employees to training situations.

**Recent studies and advances in school organization and operation, such as flexible scheduling, are contributing to a climate that will facilitate the increased use of media in education.

**Media is becoming recognized as an educational essential, not a luxury or frill. Hardware and software are becoming increasingly accepted in the classroom and the professional educator is viewing them less as a threat and more as a means of assisting him in improving the educational and economic efficiency of his teaching and in introducing more individualization in the teaching-learning process.

**Attention is shifting from teaching to learning. This seems to place additional emphasis on accommodating, within the educational structure, the needed flexibility and adaptability to individualize instruction, to help students become self-actuated, learning at their own speed, making proficient self-diagnoses, and taking corrective measures.

**The potential inherent in state, regional, and national communication and library networks provides a viable means of enriching instruction in the isolated school district and assisting the specialized individual teacher in the school system by bringing to bear a wider range of resources for learning.

**Recognizing the increased use of media in education and other segments of life, students, beginning with pre-schoolers, will have increased exposure to and will develop sophistication in the use of many types of media as a means of learning. Hence, students entering Vocational and Technical Education programs of the future will presumably have acquired measures of competence in the use of media as a part of the learning process.

It is impossible, in a paper of this length, to adequately or completely treat the implications of these trends for education, Vocational and Technical Education, and media. They are included as a backdrop for the sections which follow and to sensitize the reader to draw other implications and options from his experiences and insights.

Further, in assessing the climate for media, recognition also should be given to the "new partner in education"--private industry. Recent developments have resulted in the merger of a number of electronic firms and publishers which has brought into being an increased capacity for developing "learning systems." Recent successes in national curriculum efforts point to the opportunities and possibilities inherent in broad-based educational development efforts as a means of further facilitating the utilization of media in improving the school curriculum.

The unescapable conclusion drawn from the developments in society, the world of work, and education is that a favorable climate exists for the rapid and effective application of media to education in general and to Vocational and Technical Education specifically.

Applications of Media to Vocational and Technical Education

The general values and benefits of increased use of instructional media in education have been well demonstrated and documented. It would seem that these same benefits might also be applicable to Vocational and Technical Education; however, it may be that because of the emphasis on the psycho-motor domain in certain aspects of Vocational and Technical Education, media may have even more intensive and extensive use. This is not to say, however, that applications of media are not as desirable in the cognitive and affective domains of Vocational and Technical Education, but recognizes the relative emphasis of Vocational and Technical Education on "learning by doing."

It is recognized that increased efforts in basic research and field testing of both the hardware and software of media on Vocational and Technical Education student populations and teaching settings need to be effected to assure their optimal contribution to these curricula areas. It is believed, however, that there is presently sufficient knowledge to make positive and effective applications of selected media to the Vocational and Technical Education field.

It is not the intent of this paper to be exhaustive but to bring to the attention of the profession some of the benefits which might accrue to Vocational and Technical Education programs from increased applications of media. A variety of ways in which media could be beneficial to the Vocational and Technical Education curricula follow.

**Present instructional programs can be supplemented by using media to bring increased realism to the classroom, shop, or laboratory, thereby providing experiences that are not available locally or are beyond the resources of the local community.

**Appropriate media could make available to small and/or isolated communities a wider range of instructional alternatives in Vocational and Technical Education.

**Media could contribute effectively as a component of total learning systems for Vocational and Technical Education, spanning the range of activities from student selection to job placement. Media can be another component which vocational educators can use, along with modular scheduling and simulated laboratory experiences, in achieving greater flexibility and adaptability in their offerings.

**Media could contribute specifically to the training programs of different groups of learners (e. g., high school students, out-of-school youth, and adults), as well as provide a means of meeting diverse needs within a given vocational class, both in terms of occupational goals and student learning rates.

**Vocational offerings for the disadvantaged, particularly with reference to remedial and compensatory type classes, could be improved with the use of media. Further, increased applications of media in working with the disadvantaged would provide a means of achieving more immediate and positive reinforcement of student responses, a critical factor in working with students who have not enjoyed academic success. Since media are "impersonal" and display "infinite patience" in their relationship to the learner, they are a prime requisite in classes for students with special needs.

**Media could contribute to more effective utilization of personnel by increasing the number of students with which individual teachers can work or reducing teacher responsibility for conducting repetitive drill and routine information-giving aspects of instruction, thereby providing them with increased time to work with individual students on more advanced or individual problems.

**Simulation and other media approaches should be useful in substituting for or reducing practice time on expensive equipment or in serving more students with limited equipment.

**Accelerated development and utilization of media can provide a means of assisting Vocational and Technical Education offerings in keeping abreast of changing occupational requirements.

**Media could be used in introducing new vocational training programs (e. g., gainful employment programs in home economics education and off-farm agricultural occupations programs) and in keeping up with changing emphasis in vocational programs.

**Media could contribute to students becoming increasingly responsible for their own learning, with attendant carry-over to continuing adult education and retraining programs of formal and informal nature.

**Media may be used to improve the identification and recruitment of vocational instructors Varied approaches could enable prospective teachers to gain a better insight into the responsibilities of the vocational teacher and assist them in making a more valid and lasting occupational choice

**Media may provide a means of accelerating the preparation of vocational teachers and reducing the amount of time required to secure essential professional and technical skills.

**Media, extensively applied to in-service education programs for Vocational and Technical Education instructors, should contribute to improving their effectiveness in directing the teaching-learning process.

**More extensive use of media could contribute effectively to vocational choice among present and prospective Vocational and Technical Education students.

**Multistimuli media, utilizing sight, sound, color, and motion, could be used to improve and accelerate learning of key concepts and procedures in Vocational and Technical Education.

**The current "explosion" in the research effort of Vocational and Technical Education will undoubtedly result in a greatly increased need for development as it relates to the implications and applications of research findings. Extensive use of media will be required to adequately implement these findings.

**Media provide a potential means of contributing informally to the continued vocational preparation of individuals who cannot or will not avail themselves of formal classroom situations.

**New dimensions of thought in the educational community, recognizing the need for specialized assistance for teachers in the form of technical aides and teaching assistants, coupled with the effective use of media, would provide means of extending the sphere of influence of "master teachers" to more students.

**Media can contribute to increased educational and economic efficiency in Vocational and Technical Education curricula.

**To achieve the potential inherent in media, vocational and technical educators will need to further clarify their teaching objectives. Therefore, a potential side benefit from increased use of media should be a sharpening of vocational teaching objectives.

These potential benefits to Vocational Education from more extensive applications of media are not without their problems. The difficulties in moving toward their achievement are recognized but, intelligently approached, their potential can far outweigh their limitations--thoughtfully proceed with caution but proceed, we must.

The foregoing discussion of the general advantages of increased utilization of media in Vocational and Technical Education could potentially "trigger" numerous specific applications. There follow some selected examples where media have specific implications for Vocational and Technical Education. These are not intended to be an exhaustive treatment of applications of media to Vocational and Technical Education curricula, but, rather, are designed to generate thinking concerning additional applications.

**Certain aspects of Vocational Education are highly oriented toward skill development. Programmed materials could be used to assist vocational instructors in securing adequate drill and practice in these fundamental skill areas. Machine set-up procedures and operation, adjustment, and maintenance of tools and equipment are examples. Electronic circuit boards and panels are applications in this area.

**Vocational skills, such as machine set-ups and materials handling systems where ordering or sequencing of materials or sequential steps in an operation are critical, also lend themselves to a media approach.

**Identification of tools, equipment parts, organisms, or materials is fundamental to many Vocational Education programs. In these instances, programmed learning materials could be used to assist students in proceeding at their own pace in learning the names of tools or of symbols used in drawings and blueprints, or in identifying weeds and insects, material samples, or parts of the anatomy as in the health occupations. Multiscreen and random-access equipment might be effectively used as one type of media although less expensive media could be used.

**Single concept film loops need to be explored in greater depth. Uses might include such simple skills as resoling a shoe, operating a key punch in data processing, or adjusting an oxyacetylene cutting torch.

**Auto-tutorial materials provide a means of more effectively meeting individual needs and interests in Vocational Education classes. In cooperative education programs students are placed in common yet diverse employment situations (e. g. , drug stores, supermarkets, children's specialty shops, and clothing stores) and it is not always possible for the coordinator to provide the amount of individualized instruction desirable. Programmed materials in stock and inventory control could be used to assist students in independent study on unique problems relating to this occupational skill in their own employment situation and in securing more extensive instruction (drill and practice) on the common elements of merchandising. Other media might be used to enrich the general experiences of accelerated students by going beyond the normal class instruction.

**Television monitors could be used in industrial plants and other employment locations to provide vocational instructors with a means of monitoring a complex machine operation that is not available at the school shop or laboratory, thereby introducing the world of work to the classroom, shop, or laboratory. Such a procedure would minimize the amount of time required for field classes, reduce interruptions at the place of employment, provide for needed repetition and continued observation, and would be less disruptive of both school and business schedules. Further, such operations could be recorded on video tape and made available as part of a local, state, or national media library. Cameras also provide a means of securing a view of a procedural operation or technique where it is physically impossible or difficult to have large class observation; for example, in the health occupations area. A variety of tapes or film might be used in teaching safety where it may not be desirable or possible to have class participation, such as police and fire training programs and shop safety training programs.

**Experiences in the space program and other areas of endeavor provide convincing evidence of the values of simulation as a means of securing "pre-employment experience" through procedures less expensive and/or hazardous than the actual operation. Media materials could be used to secure simulated experiences on highly expensive machines or machines that are currently used in industries but are not available to the schools because of cost, space, or other reasons. Further, such an approach would presumably reduce the amount of time that individual students would need to spend on "drill and practice" on the actual machine. In more complex operations it will be necessary to use a multimedia approach in developing critical understandings and abilities.

**Computer assisted instruction could be adapted to a wide range of uses in Vocational and Technical Education. It would be applicable to drill and practice, tutorial, and dialogue systems. A computer assisted program could be developed wherein individual classrooms within a district or schools within a state or region could draw on a "bank" of programs to secure specialized help and assistance in a wide range of specific areas of Vocational and Technical Education. For example, programs could be developed on shop mathematics, business letters and forms, and preparing supervisory and management personnel, to name but a few.

**Computer gaming techniques also seem to hold promise for certain Vocational Education areas relating to management instruction, such as farm, home, and small business management.

**Statewide networks of closed circuit television can be developed to further contribute to providing a broader range of instructional opportunities to individual classrooms and districts. A series of programmed demonstrations, supplemented with auto-tutorial materials and teaching discussion guides and similar materials, could be used in a wide range of situations, such as demonstrating decorating a room, closing a sale, preparing floral arrangements, or conducting employee training and supervisory conferences.

**Airborne television, such as the Midwest Program on Airborne Television Instruction, should be utilized as a means of providing more programmed materials oriented toward Vocational and Technical Education. Such materials should not be limited to students but should also be used as a means of in-service education for vocational teachers.

**Various media techniques should be used to assist vocational teachers and students with evaluation of student knowledge and performance. Such applications would permit both groups to be self-evaluative; the student in terms of specific strengths and weaknesses about a given concept or skill, and the teacher through the use of the individual and summation reports of student performances in diagnosing deficiencies and limitations in his instruction and in planning needed remedial or corrective instruction. For example, in developing needed skill and understanding in closing an accounting year, where a number of learning stations are linked to a single computer with such a program, the vocational instructor could utilize the print-out during and at the end of the class to assess past instructional efforts and to plan future instruction.

**Instructional packages drawing heavily on multimedia devices, if carefully developed, could be used by a variety of vocational curricular areas to achieve vocational teaching objectives common to several occupations. A number of vocational areas have the similar need to develop student skills in the use of measuring devices. Other examples are design, layout, and planning, as in sheetmetal, woodworking, or drapery shops, and in the organization and placement of tools and equipment to expedite work flow.

**The area of vocational guidance provides a fertile setting for more extensive applications of media. In addition to some of the traditional career film strips, booklets, and films, more sophisticated approaches of computer assisted counseling and career gaming techniques should be explored. Current studies underway in this area should yield new insights into these alternatives and opportunities. Experiences to date would seem to indicate that multimedia approaches to vocational counseling should be developed and beamed at audiences other than the student. For example, mass media should be utilized to acquaint parents and other groups who influence vocational choice with the wide range of employment opportunities, training requirements, and working conditions of various occupations.

**The obvious applications of more extensive utilization of media in updating and acquainting counselors with the world of work and their responsibilities and opportunities in working with noncollege-bound students should not be overlooked.

**The application of micro-teaching to vocational and technical teacher education preparation promises to increase efficiency and effectiveness. It provides a means for the student teacher and the supervising teacher to review the "capsuled" teaching experience by evaluating and discussing in detail the several dimensions of the teaching-learning process, such as planning and organization, student participation and thinking, classroom management, and techniques and procedures in use of media, models, and materials. Alternative adaptations of micro-teaching should be considered in Vocational Education. For example, in certain vocational fields where primary emphasis is placed on apprenticeship teaching, a technician could capture the micro-teaching experience of the apprentice on video tape and transmit it in closer contact with technical specialists in the universities and/or industries. Subject-matter specialists could provide quick responses to technical problems confronting vocational instructors. This technique also could provide a linkage for systematic in-service classes. This equipment installed in the vocational school could be utilized by all areas of education and for adult education classes. This same technique could be used in working with former vocational students in more technical occupations. For example, a technician might utilize this device to secure follow-up instruction and clarify specific problems unique to a given employment situation. The electrowriter or comparable equipment would offer a particular advantage to those vocational students who do not have the requisite typing skills for utilizing some computer-based instructional programs.

While not restricted to a specific media, a general point should be made concerning the use of color in applications of media to Vocational and Technical Education. Color is a critical factor in certain diagnostic techniques involved in vocational instruction, such as identifying nutritional deficiencies in plants, tempering metals, tracing electronic circuits, preparing advertising layouts, or tinting hair in cosmetology.

The optimal applications of media to this Vocational and Technical Education curriculum are practically infinite. Large-scale research and development activities are needed. Aggressive, creative leadership and financial support at state and national levels must be provided. Specific attention needs to be given to both the identification of media requirements in Vocational and Technical Education and the development of new media that can contribute to improved effectiveness in this instructional area.

Strategies for Securing Increased Application of Media to Vocational and Technical Education Curricula

Upon the supposition that further development and use of media in Vocational and Technical Education are essential, this section addresses itself to broad strategies which might be employed to achieve more optimal utilization. It also takes cognizance of some of the potential problems and limitations in this development. The authors take the fundamental position that educational media should augment the educational process, not structure it.

Following are a number of tactical approaches that might be employed to achieve the broader strategic goals. These interrelated items are in no inherent order.

**The Vocational and Technical Education community should address itself to the fundamental problem of identifying objectives stated in behavioral terms to give added direction to the development of needed media.

**The Vocational and Technical Education profession should work toward the identification of priority problems in attaining program objectives that provide appropriate opportunities for assistance from media. These problems should relate to such factors as meeting the vocational training needs of all age groups, future employment opportunities, projected student numbers, and the potential contributions of media to a given occupational area.

**Extensive research efforts should be undertaken to identify the common and unique behaviors of major and emerging occupations in Vocational and Technical Education. To the degree possible, these behaviors should be "clustered" as a means of justifying more extensive investments in media. Media might be developed for competency clusters that would be applicable to a wide range of vocational objectives.

**Considerable emphasis should be placed upon developing increased "consumer sophistication" in the Vocational and Technical Education profession. Inherent in this need is the desirability of working toward a "labeling" procedure for media that might correspond to the type of descriptive materials now available on standardized tests. Such labels should include information as to specific behavioral objectives sought, student group or learner population for which the materials were developed and upon whom they were tested (replications and geographical location), and other research findings on the relative success of the media under field tests. Other information which should be provided the media consumer includes age group of learners for which the media were designed, desired prerequisites for the learner in terms of concepts and experiences, and the occupational area to which the behavioral goals relate. Suggestions to the teacher should include methods of reinforcement, supplementary materials, and follow-up activities.

**It would seem desirable to develop an educational consumer guide that would assist local vocational teachers and administrators in obtaining critical information about their future investments in media. Ultimately it would be desirable to have a publication for the users of educational media materials that would provide them with valid information on media, just as the Mental Measurements Yearbook provides on tests and measurements.

**Conferences should be called to provide researchers with opportunities to communicate their latest findings to media producers and vice versa, giving special attention to message design and media development. Continuing dialogues need to be established and maintained. Educators need a communication whereby they can transmit their findings and requirements to the commercial producers of media. Further, deliberate mechanisms should be established for the invention and development of hardware, teaming the most appropriate talents from the educational and technological communities.

**There is need for more extensive development and testing of new formats and designs in educational media. For example, we have been locked into the pattern of 16 mm. films whose length too often has been determined by reel size and other noneducational considerations. It would be particularly helpful to vocational teachers to have a number of "trailer clips" on films that would convey a single concept or specific sequence of activities identified in the context of the main film. The attached trailer clips could then be shown several times for needed repetition.

**One of the critical problems in the commercial development of needed media is the decentralized market which exists in Vocational and Technical Education as well as in the general education field. There also exist decentralized decision-making and decentralized purchasing, which pose real problems for commercial producers of educational media. As an approach, it may be desirable to give attention to the possibilities of developing state specifications for media or placing developed media materials on a state-approved or adopted list. This might provide commercial companies with additional incentives to make the investments needed to carefully develop and test materials for specific Vocational Education purposes. An alternative to the approach of developing state specifications and then placing those media which meet the requisite quality requirements on the adopted list would be to develop educational specifications and contract for their development through competitive bidding. While the state is the most logical organizational unit to achieve this, consideration also should be given to the alternative of multistate or a regional approach.

**Progress should be made in the Vocational Education profession in developing "educational specifications" for media that would sharpen message design and identify the target learner group. These specifications also should include such factors as behavioral changes to be achieved; characteristics of the learner group, including age and educational level; the operational setting in which it is designed to be used; the hardware available; and other media available to supplement it.

**Educational leaders should be aware of the potential danger of media acting as an inhibitor of needed curricular changes. Commercial producers may be loath to change or update media, consonant with the changing requirements of the world of work, if they have not yet achieved a satisfactory sales volume. Further, the temptation is always there to continue to market last year's model to avoid additional costs of development, testing, and refinement.

**Recognizing the expense involved in developing desirable educational media designed for specific educational purposes, objectives, and audiences, consideration should be given to seeking governmental subsidies for the development of needed media materials. Such materials should be exemplary in terms of the requirements set forth earlier in the paper.

**The structures of the regional laboratories and the research and development centers should be utilized in clarifying objectives, identifying priorities, surveying "market" needs for media within Vocational and Technical Education, and communicating these needs and specifications to appropriate agencies.

**Consideration should be given to the feasibility of establishing an ERIC clearinghouse dealing primarily with research and development in educational media. The present Vocational and Technical Educational ERIC clearinghouse should acquire, index, abstract, and disseminate information on research and media materials related specifically to Vocational and Technical Education.

**Procedures for the dissemination of research information to consumers of educational media should be initiated and structured so as to increase the teacher's sophistication in the most effective selection and use of media.

**Evaluation of media should take into account their educational and economic efficiency, raising such questions as the comparative advantage of Media A versus Media B in terms of amount of learning, the time required to achieve this level of learning, and the economic costs of producing and utilizing the media. In this connection, it should be noted that much of the hardware and software currently being marketed was designed for neither education in general nor Vocational and Technical Education specifically, but has been adapted to their use. Further, work in this area requires sharpening of education's needs and the testing of these materials with appropriate groups in normal settings.

**There should be developed a profession-wide research program designed to assess the optimal application of media to Vocational and Technical Education, to conduct field testing of specific programs including both hardware and software in normal classrooms, shops, and laboratory conditions. Such assessments should include provisions for testing equipment of all kinds, considering such factors as simplicity of operation, efficiency, and appropriateness for the Vocational Education classroom. Demonstration centers should be established to facilitate the rapid dissemination and adoption of tested media innovations applicable to Vocational and Technical Education curricula.

**State vocational administrators should consider increasing investments in certain areas of media as a means of advancing programs in desired directions.

**Vocational and technical teacher education programs should be examined with a view to improving their contribution to more extensive and effective utilization of educational media. The training experiences of prospective vocational teachers should not be limited to the mere manipulations and operation of audiovisual equipment but also should develop an understanding of the implications of the findings on educational media research for the Vocational Education classroom. Preparation should be designed to help them become more sophisticated and discriminating consumers of educational media. Further, teacher education programs themselves should consider increased use of media in the professional sequence. The use of micro-teaching has been identified earlier as a promising example.

**Instructional programs in Vocational and Technical Education should give consideration to making their present students self-actuating learners by training them in the proper utilization of auto-tutorial instructional materials and other media approaches as a means of enhancing their abilities to continue to learn. This should enable former vocational students to keep abreast of technological change by helping them to further develop their learning skills through self-directed study and diagnosis.

Summary

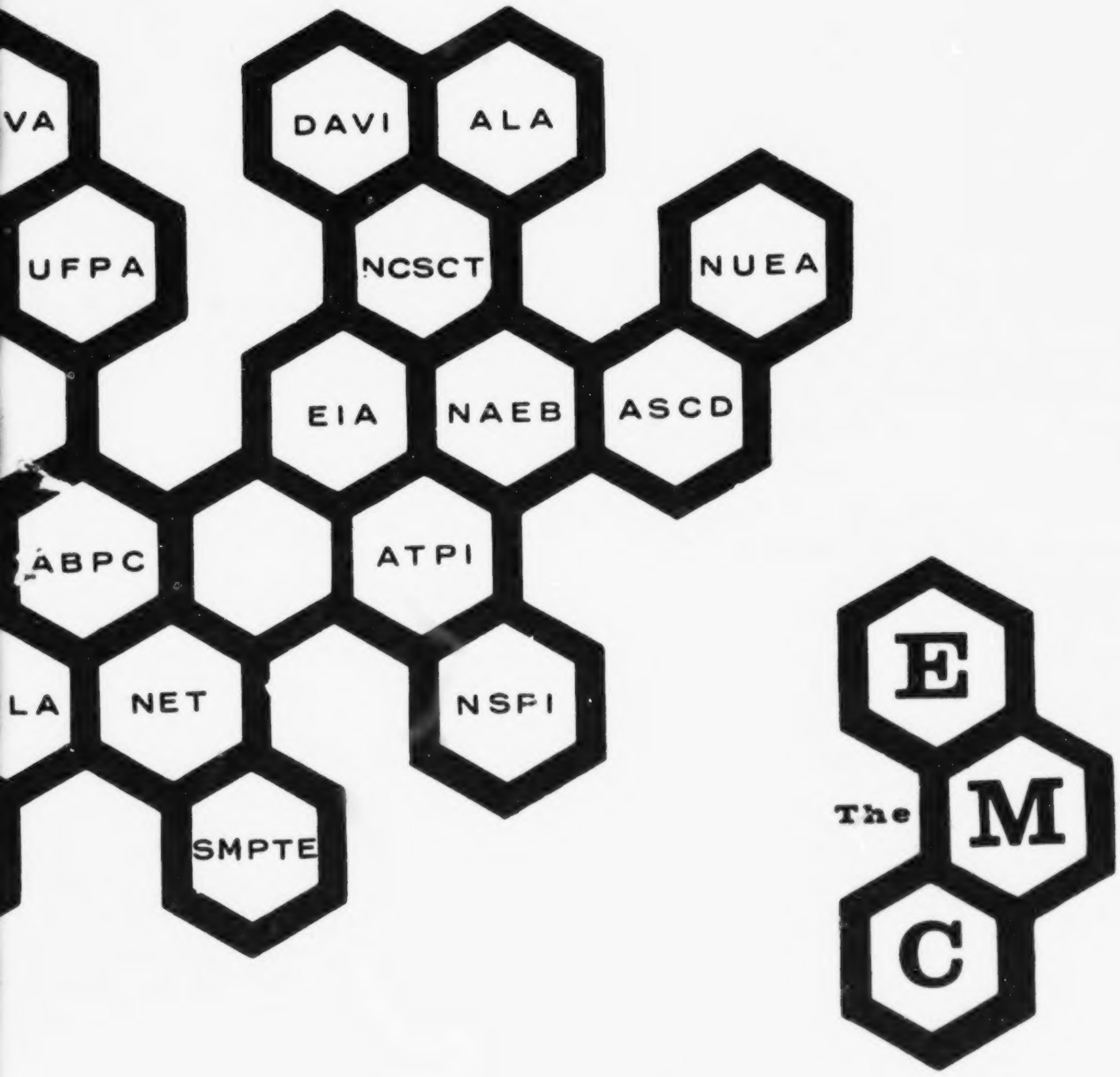
This paper has been based on the premise that increased use of media would add to the effectiveness and efficiency of Vocational and Technical Education. Suggestions and recommendations were made to help assure that future developments of media are positive and efficient. Needed relationships were identified.

This paper was intended to stimulate ideas, initiate dialogue, and contribute to future development and applications of media to Vocational and Technical Education curricula.

It is recognized that a great deal more research, development, and testing need to be done in terms of specific media applications; however, limited insights into the learning process restrict optimal development. Further, current knowledge of hardware and software and their most effective combinations poses limitations. There are many unanswered questions but enough is known to merit aggressive development in this area.

This paper is not an end, but, hopefully, the beginning of what should become profession-wide concern and involvement.

APPENDIX E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The Educational Media Council

FINAL REPORT

Project No. 5-0080
Contract No. OE 5-16-032

A STUDY OF THE CONCENTRATION OF EDUCATIONAL MEDIA RESOURCES TO ASSIST IN CERTAIN EDUCATION PROGRAMS OF NATIONAL CONCERN

PART II: EDUCATIONAL MEDIA AND VOCATIONAL EDUCATION

May, 1967

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE

Office of Education
Bureau of Research

Staff Paper Number One

A SELECTIVE BIBLIOGRAPHY ON NEW MEDIA AND VOCATIONAL EDUCATION AND RETRAINING

Prepared by Clarice Kelley

February 1966

The Educational Media Council
1346 Connecticut Avenue, N.W.
Washington, D.C. 20036

FOREWORD

The Educational Media Council is composed of representatives of fifteen national nonprofit organizations, including a core of professional education associations. The Council is concerned with educational applications of the entire range of educational media and materials from books to films, television, programed instruction and instructional systems.

In 1965 the Educational Media Council entered into a contract with the U.S. Office of Education for the study and analysis of the role that the newer media can play in two programs of national concern: vocational education and retraining and programs for the education of the culturally disadvantaged. This study required the concentration of the resources of the Council and its member organizations on the problem of providing for the best possible use of educational media in two programs where such materials can make a significant impact in the direction of improving education and training.

This selective bibliography, prepared by Clarice Kelley, administrative assistant of the Educational Media Council, is the first of a series of staff papers which will evolve from an analysis of current programs on vocational education and retraining and in the education of the culturally disadvantaged to determine the optimum role which might be played by media and media organizations.

John D. Bardwell
Executive Director

A Project Funded under a Contract with the
United States Office of Education

TABLE OF CONTENTS

Page

FOREWORD . . . 2

*SECTION II SELECTED VOCATIONAL EDUCATION REFERENCES . . . 4

SECTION III ARTICLES AND PAPERS ON INSTRUCTIONAL TECHNOLOGY AND VOCATIONAL EDUCATION . . . 5

- A. General Application to Vocational Education . . . 5
- B. Industrial-Technical Education . . . 7
- C Home Economics Education . . . 14
- D Business Education . . . 15

SECTION IV DOCTORAL DISSERTATIONS IN VOCATIONAL EDUCATION WITH MEDIA IMPLICATIONS . . . 17

- A. Industrial Arts, Vocational-Technical Education . 17
- B. Business Education . . . 19
- C. Home Economics . . . 21
- D. Vocational Agriculture . . . 22

SECTION V ONGOING RESEARCH STUDIES . . . 23

* An introductory Section I listing SELECTED BASIC TEXTS AND GENERAL REFERENCES IN INSTRUCTIONAL TECHNOLOGY prepared for dissemination of this Report to vocational education specialists who are not media specialists is omitted, as inappropriate, from the Report itself.

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MIKHAIL, Fouad Ragheb. The Use of Selected Audio-Visual Materials by Teachers of Vocational Agriculture in Wisconsin. University of Wisconsin. 1960. DA XX:555.

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Section V

ONGOING RESEARCH STUDIES
U.S. Office of Education
Division of Adult and Vocational Research

The following information on research studies under the U.S. Office of Education's Division of Adult and Vocational Research is included to give the reader an idea of the types of studies which are now being conducted which do include media applications. Abstracts of the project proposals are available from the Division of Adult and Vocational Research. In requesting abstracts please include the project summary number.

AMERICAN INSTITUTES FOR RESEARCH
Pittsburgh, Pennsylvania

Title: Planning and Development of Research Programs in Selected Areas of Vocational Education
Principal Investigator: Leslie J. Briggs, Director
Instructional Methods Program
Duration: June 1, 1965 - November 30, 1966.
Project Summary Number: ERD-259-65

BROOKS FOUNDATION, The
Santa Barbara, California

Title: Multi-Purpose Film on the Vocational Education Act of 1963
Principal Investigator: Mr. Russell Furse, Executive Director
The Brooks Foundation
Duration: May 1, 1965 - April 30, 1966
Project Summary Number: EO-183-65

GEORGE WASHINGTON UNIVERSITY, The
Washington, D.C.

Title: Development of a Curriculum and Materials for Teaching Basic Vocational Talents
Principal Investigator: Dr. John T. Dailey, Research Professor
Duration: April 1, 1965 - September 30, 1966
Project Summary Number: ERD-023-65

KANSAS STATE TEACHERS COLLEGE
Emporia, Kansas

Title: To Develop a Program in Salesmanship for Testing the Use of Program Text-Books in Adult Education
Principal Investigator: Raymond B. Russell
Duration: September 1, 1965 - January 31, 1966
Project Summary Number: 5-8267-2-32

NEW YORK MEDICAL COLLEGE
New York, New York

Title: The Development of a Beginning Reading Skills Program
Principal Investigator: Dr. Lassar G. Gotkin, Research Associate, Institute for Developmental Studies and Assistant Professor (Research), Department of Psychiatry
Duration: July 9, 1965 - October 31, 1966
Project Summary Number: ERD-066-65

PENNSYLVANIA STATE UNIVERSITY, The
University Park, Pennsylvania

Title: Experimentation with Computer-Assisted Instruction in Technical Education
Principal Investigator: Dr. Harold E. Mitzel, Professor of Psychology and Education, and Dr. George L. Brandon, Head, Department of Vocational Education
Duration: June 1, 1965 - May 31, 1969
Project Summary Number: ERD-199-65

QUINCY (Massachusetts) PUBLIC SCHOOLS and
THE AMERICAN INSTITUTES FOR RESEARCH

Title: Development and Evaluation of an Experimental Curriculum for the New Quincy, Massachusetts, Vocational-Technical School
Principal Investigators: Dr. Maurice J. Daly, Assistant Superintendent for Vocational-Technical Education (Quincy P.S.), and Dr. Robert M. Gagne, Director of Research, The American Institutes for Research

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QUINCY--continued

Duration: April 26, 1965 - June 30, 1966
Project Summary Number: ERD-005-65

STANFORD UNIVERSITY
Stanford, California

Title: Greater Flexibility in Course Design for Vocational Education Through Computer-Based Program Scheduling
Principal Investigator: Dr. Dwight W. Allen
Professor of Education
Duration: May 1, 1965 - June 30, 1966
Project Summary Number: ERD-188-65

STANFORD UNIVERSITY
Stanford, California

Title: Production of a Motion Picture for the Training of Teachers in Problems of Human Relations in Teaching the Socially and Economically Disadvantaged
Principal Investigator: Henry S. Breitrose, Instructor in Film
and Research Associate,
Institute for Communication Research,
Broadcasting and Film Division
Duration: April 15, 1965 - April 14, 1966
Project Summary Number: ERD-077-65

SAN BERNARDINO VALLEY COLLEGE
San Bernardino, California

Title: Project NOTIFY--Needed Occupational Television Instruction for Youth
Principal Investigator: William Lawson
Duration: June 1, 1965 - May 31, 1966
Project Summary Number: EO-138-65

UNIVERSITY OF PITTSBURGH
Pittsburgh, Pennsylvania

Title: A Multi-Media Approach to Communicating Occupational Information to Non-College Youth
Principal Investigator: Dr. Ann M. Martin, Research Director
Center for Library and Educational
Media Studies
Duration: October 1, 1965 - November 30, 1967
Project Summary Number: EO-402-66 (OE-6-85-052)

APPENDIX F

A
DAVI
ALA
UFPA
NCSCT
NUEA
EIA
NAEB
ASCD
ABPC
ATPI
A
NET
NSPI
SMPTE

The EMC Educational Media Council

FINAL REPORT

Project No. 5-0080
Contract No. OE 5-16-032

A STUDY OF THE CONCENTRATION OF EDUCATIONAL MEDIA RESOURCES TO ASSIST IN CERTAIN EDUCATION PROGRAMS OF NATIONAL CONCERN

PART II: EDUCATIONAL MEDIA AND VOCATIONAL EDUCATION

May, 1967

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE

Office of Education
Bureau of Research

APPENDIX F

AVAILABILITY OF MEDIA COURSES
IN
TEACHER EDUCATION FOR VOCATIONAL EDUCATION

At the last meeting of the EMC Vocational Education Committee several questions arose regarding teacher education for vocational education -- where it is conducted, and the extent to which media courses are available in these programs. In attempt to gather this information, a search of college catalogs was conducted by a member of the EMC staff.

The appended table shows the availability of media courses in ten selected institutions which prepare teachers for various specialized areas of vocational education. The institutions were selected by Dr. Merle Strong, Assistant Director for Ancillary Services, Program Services Branch, Division of Vocational and Technical Education, USOE. They were chosen to represent a geographical and enrollment cross-section of institutions offering teacher education programs for vocational education.

Of the ten institutions, only one does not offer at least one media course. Four of the ten institutions require a media course for certain areas of vocational education. Only two of these four institutions have the same requirement for their general secondary education majors!

STATE Institution	PREPARE TEACHERS FOR[1]					INFORMATION ON UNDERGRADUATE MEDIA COURSES				
	AE	BE	DE	HE	TI	Number of media courses	VOC ED MAJORS		GEN SEC ED MAJORS	
							required	recommended elective	required	recommended elective
ARIZONA Arizona State U. Tempe		X	X	X		3	no	no	no	no
CALIFORNIA Univ. of Calif. Los Angeles		X		X		2	yes	--	yes	--
COLORADO Colorado State U. Fort Collins	X	X	X	X	X	cannot determine number; courses for spec. areas	AE,DE	TI	no	no
FLORIDA Florida State U. Tallahassee		X	X	X	X	cannot determine number; courses for spec. areas	no	DE, TI	no	no
GEORGIA U. of Georgia Athens	X	X	X	X	X	4	no	no	no	no
ILLINOIS Univer. of Ill. Urbana	X	X		X	X	1	no	no	no	no
OHIO Ohio State U. Columbus	X	X	X	X	X	4	no	no	no	no
NEW YORK Cornell Univ. Ithaca	X			X		0	--	--	--	--
PENNSYLVANIA[2] Penn State U. University Park	X	X		X	X	cannot determine number; courses for spec. areas	AE, HE, TI	--	yes	--

VIRGINIA Va. State College Petersburg	X	X		X	X	4	BE only	no	no	no
WISCONSIN Stout State College Menomie				X	X	1	no	TI	no req. except for 5 clock hr. unit on equip. oper. in "Intro to Education"	no

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[1]
AE: Agriculture Education
BE: Business Education
DE: Distributive Education
HE: Home Economics
TI: Trade and Industrial

[2] Pennsylvania is the only state in the union which requires a media course for teacher certification.